VOL. 171, NO. 4 AMERICAN OCTOBER, 1949

Gas Journal

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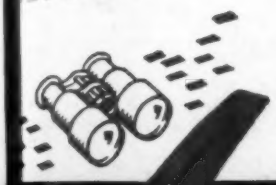
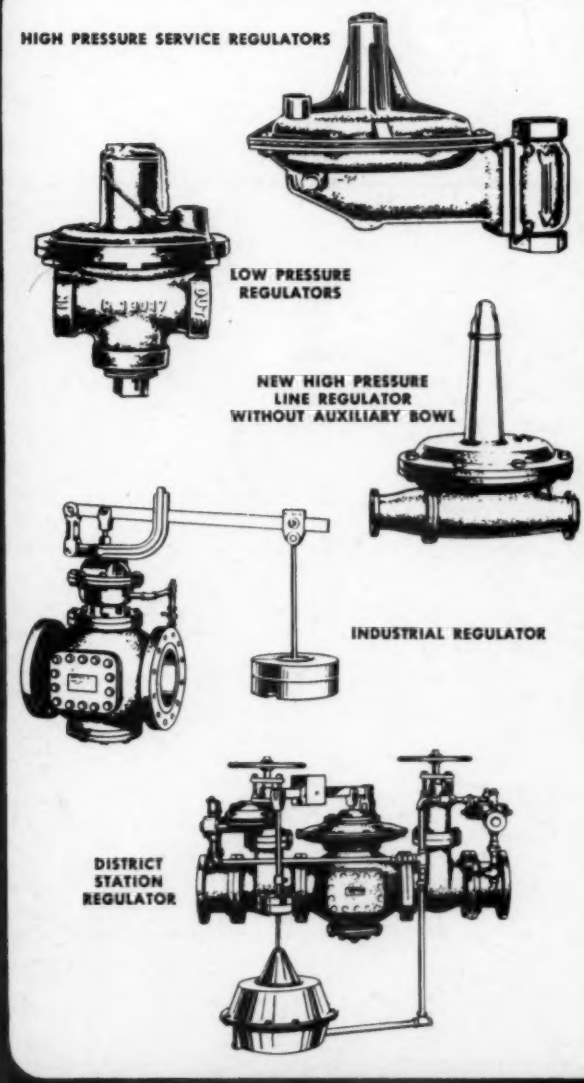


Looking Ahead

Here at Reynolds Gas Regulator Company our engineering staff is constantly at work developing, designing, improving the gas control products that carry the Reynolds name. New problems involving higher pressures and heavier loads are being studied and solved. Many improvements in old established products have been made and new units are being created for specific gas control requirements. Let our experienced gas control engineers help you solve your gas control problems.


HIGH PRESSURE SERVICE REGULATORS
LOW PRESSURE REGULATORS
NEW HIGH PRESSURE LINE REGULATOR WITHOUT AUXILIARY BOWL
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GAS CONTROL SINCE 1892

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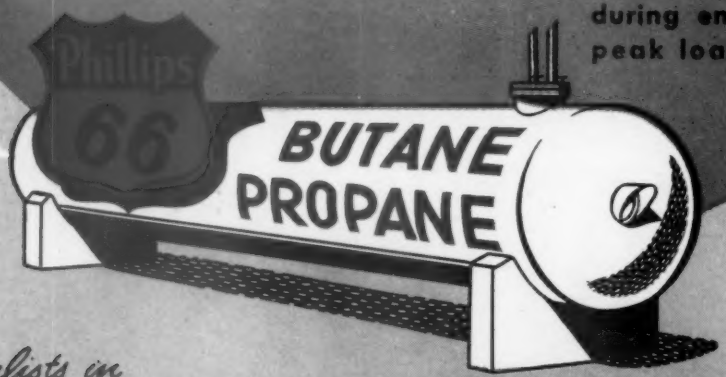

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. . . As announced

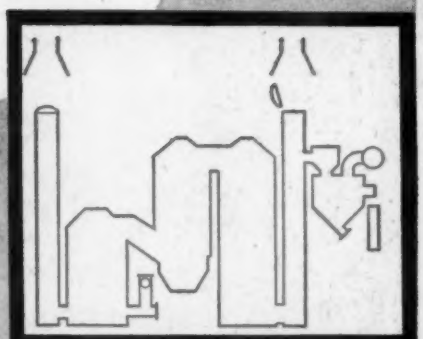
IN LAST MONTH'S ISSUE

The SEMET-SOLVAY REGENERATIVE REVERSE FLOW OIL GAS PROCESS

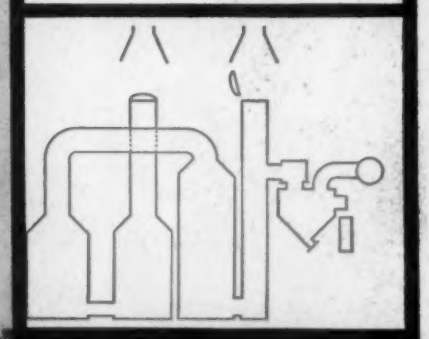
PATENTS APPLIED FOR

is adaptable to existing production equipment.

FOR REVERSE FLOW WATER GAS SETS



FOR STANDARD WATER GAS SETS

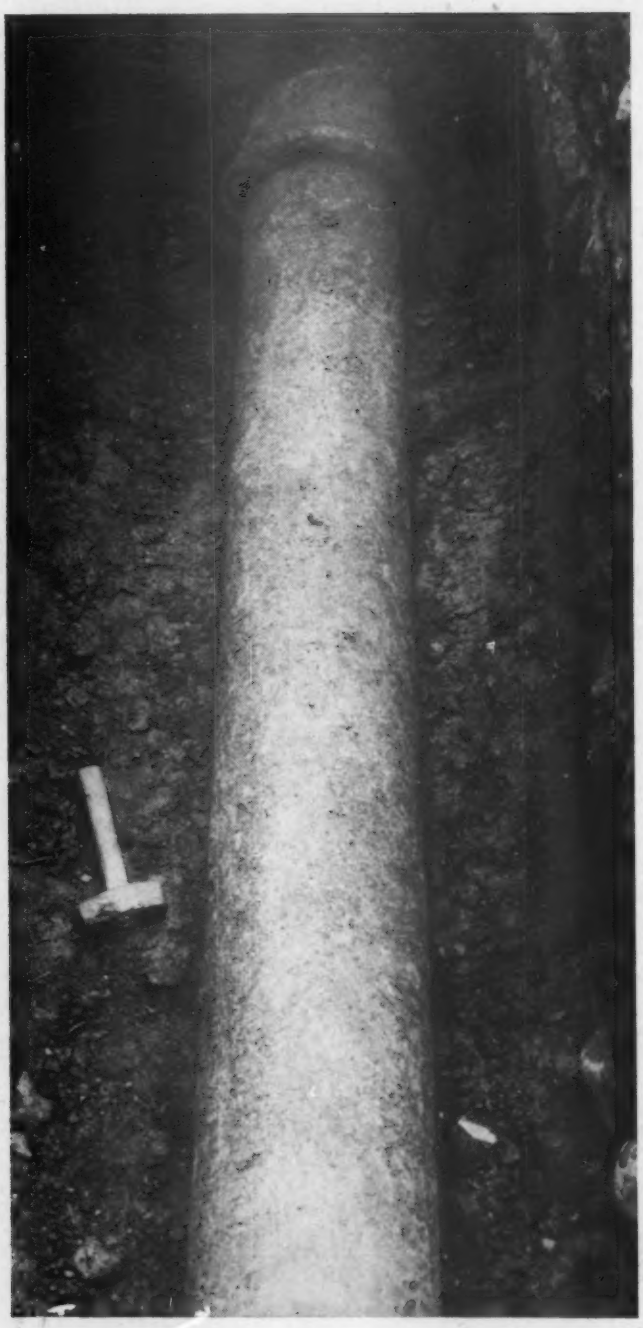


for further details—see our representatives at the A.G.A. convention in Chicago

SEMET-SOLVAY ENGINEERING DIVISION
40 RECTOR ST., NEW YORK 6, N.Y.

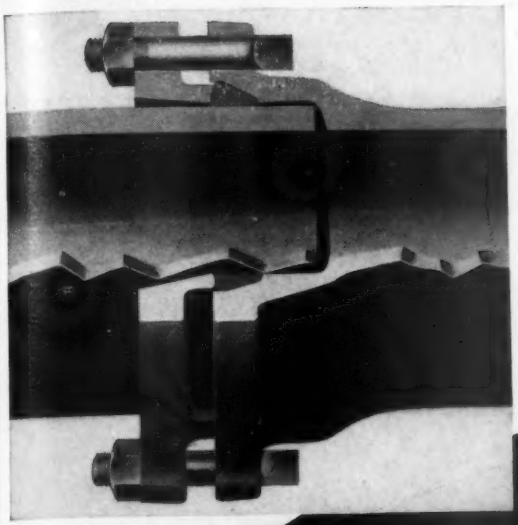
ALLIED CHEMICAL & DYE CORPORATION

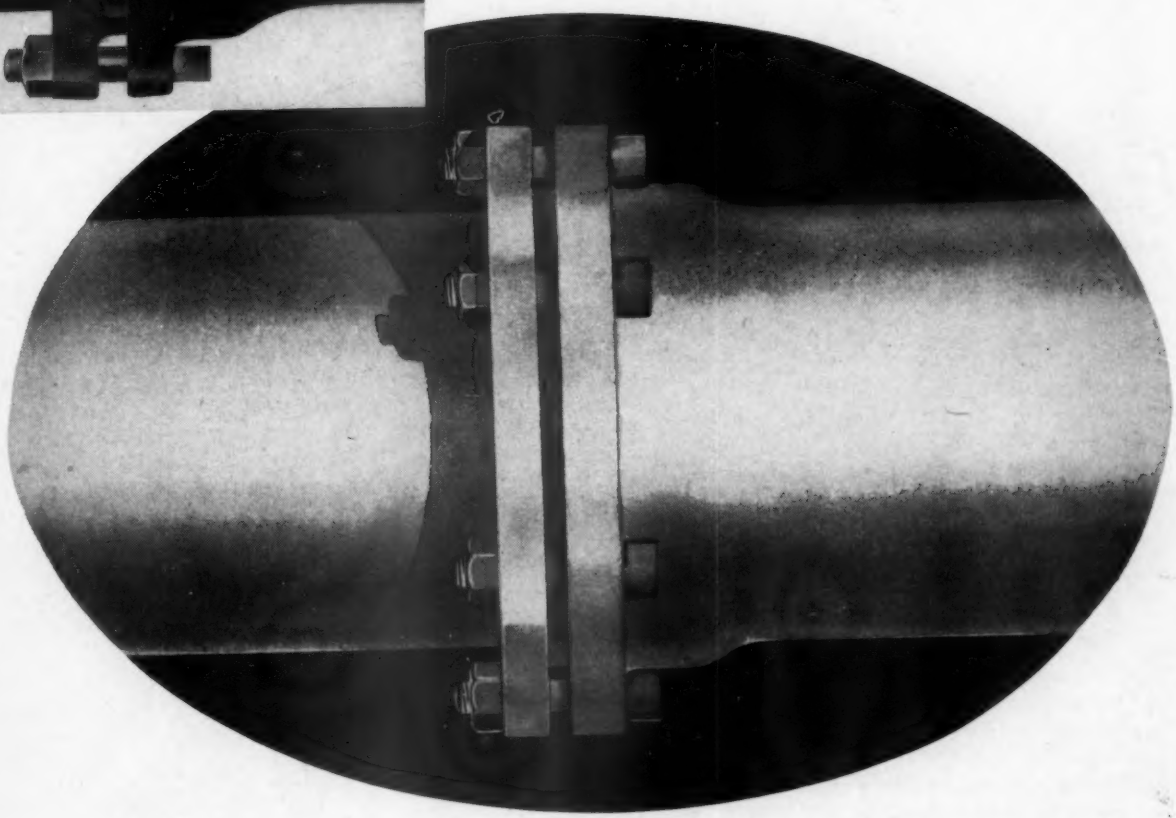
AMERICAN GAS JOURNAL, October, 1949. Vol. 171, No. 4. Published monthly by American Gas Journal, at 34 North Crystal St., East Stroudsburg, Pa., Executive and Editorial offices at 205 East 42nd Street, New York 17, N. Y. Entered as second class matter October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879. Printed in U.S.A.



• Why have so many gas utilities *standardized* on *standardized* mechanical joint cast iron pipe—for all types of gas at low, intermediate and high pressures — for all new distribution mains? Ask their distribution engineers and construction superintendents. They will tell you that mechanical joint cast iron pipe not only has a known record of long life and tight joints but costs less to lay. More footage can be laid per day with minimum equipment — with less delays in wet weather and less trouble with wet trenches — and with lower labor cost. Standardized and interchangeable accessories and fittings add the final touch to economy and efficiency. Cast Iron Pipe Research Association, T. F. Wolfe, Engineer, People's Gas Building, Chicago 3.

• Unretouched photograph of a cast iron gas main installed a century ago by Hartford Gas Company, Hartford, Connecticut.





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STANDARDIZED MECHANICAL JOINT

PIPE

For New — ADAPTABILITY..... EASY SERVICING

Check MODEL 44 for THESE ADVANTAGES:

- **Versatile.** As a pressure-reducing regulator, may be direct-operated, pilot-loaded with "SENSITROL," or instrument-operated. Excellent as a motor valve for use with differential-limit controls.
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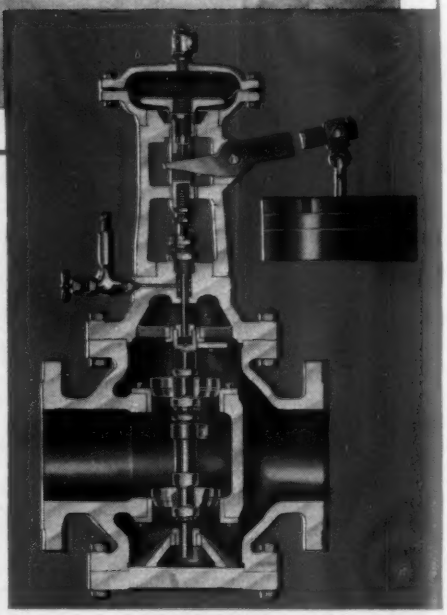
- **Compact Design.** Minimum weight, minimum space requirement for given capacity and flow areas, reduces cost of equipment and housing.
- **High Safety Factor.** Extra-thick body walls of high-strength iron or electric cast steel, tested and machined for perfect alignment.

Threaded Stem Connectors, Flanged Pressure Joints, Lubricated Stuffing Box, Guide Wings Eliminated, Other Improvements.



MODEL 44
Balanced-Valve Regulator
Pipe Sizes, 2" to 16"
High-Tensile Iron, 125 lbs. W.P. (Series 15)
High-Tensile Iron, 600 lbs. W.P. (Series 30)
Electric Cast Steel, 1200 lbs. W.P. (Series 60)

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THE *New* CLEVELAND TRENCHER

The Model 92 BABY DIGGER

A SMALL—COMPACT—STURDY TRENCHER

WITH FULL-CRAWLER ON-THE-JOB MANEUVERABILITY AND RUBBER-TIRED TRUCK-SPEED MOBILITY

Just right for House Services and all City and Suburban Gas Trenching, the Cleveland "92" with its 12 large-capacity buckets flush mounted cuts to a depth of 5 full feet and a width range of 10 to 20 inches. Travels on specially designed, smooth-surfaced crawlers, minimizing sidewalk damage, assuring perfect balance and sure-footed traction, and allowing hairline maneuvering. With the "92" you can place the edge of a 10" trench within 22" of a side wall. The operator-controlled power shift arc conveyor enables you to place the dirt where you want it, simplifying your back filling problem.

These are but a few of the many reasons why you will find the BABY DIGGER MODEL 92 one of the most profitable machine investments you ever made.

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WRITE FOR BULLETIN No. S-53

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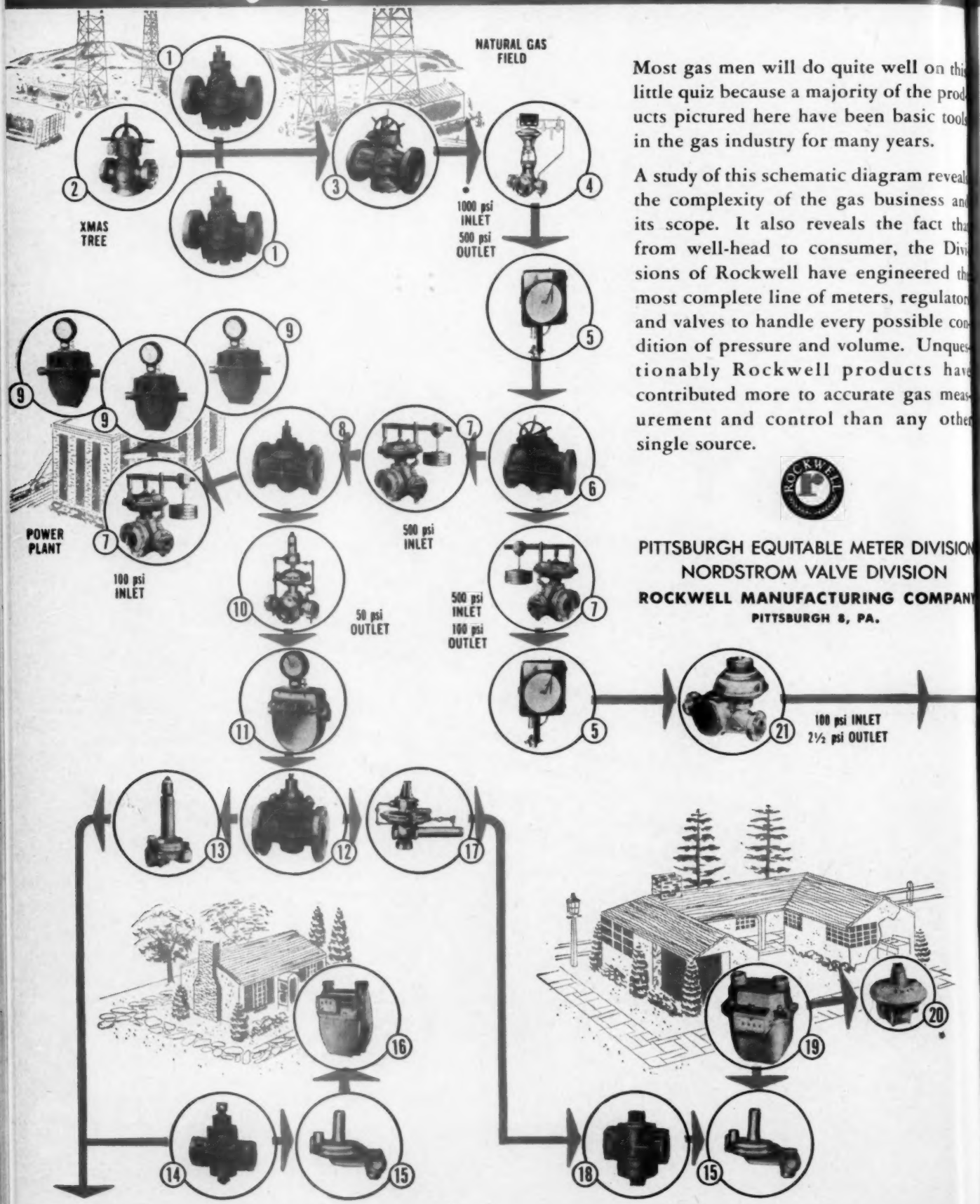
How many of these ROCKWELL - EMCO



Most gas men will do quite well on this little quiz because a majority of the products pictured here have been basic tools in the gas industry for many years.

A study of this schematic diagram reveals the complexity of the gas business and its scope. It also reveals the fact that from well-head to consumer, the Divisions of Rockwell have engineered the most complete line of meters, regulators and valves to handle every possible condition of pressure and volume. Unquestionably Rockwell products have contributed more to accurate gas measurement and control than any other single source.

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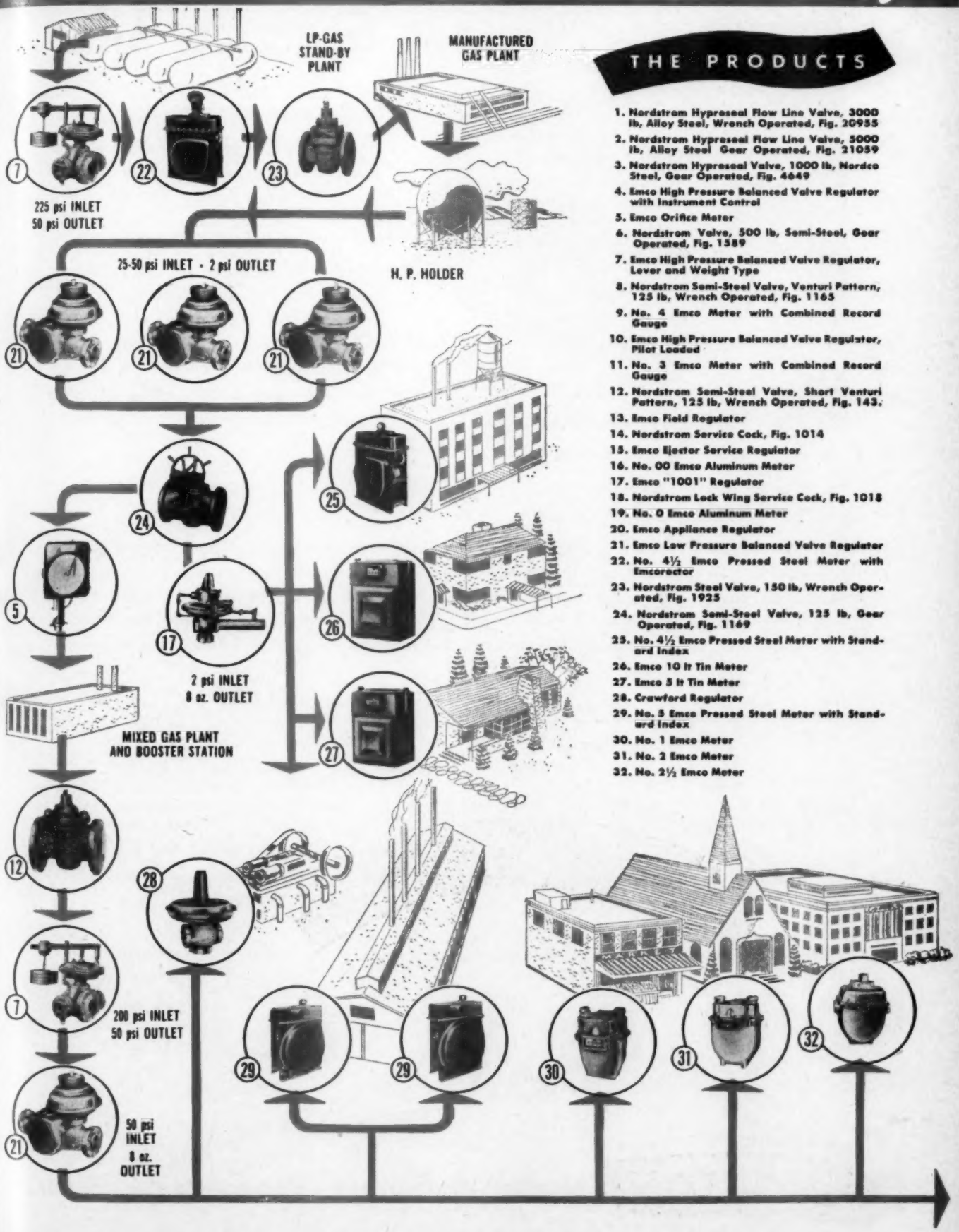
PITTSBURGH 8, PA.

ACCURATE MEASUREMENT AND CONTROL

and NORDSTROM products can you identify?



THE PRODUCTS

1. Nordstrom Hypreseal Flow Line Valve, 3000 lb, Alloy Steel, Wrench Operated, Fig. 20935
2. Nordstrom Hypreseal Flow Line Valve, 5000 lb, Alloy Steel Gear Operated, Fig. 21059
3. Nordstrom Hypreseal Valve, 1000 lb, Nordco Steel, Gear Operated, Fig. 4649
4. Emco High Pressure Balanced Valve Regulator with Instrument Control
5. Emco Orifice Meter
6. Nordstrom Valve, 500 lb, Semi-Steel, Gear Operated, Fig. 1589
7. Emco High Pressure Balanced Valve Regulator, Lever and Weight Type
8. Nordstrom Semi-Steel Valve, Venturi Pattern, 125 lb, Wrench Operated, Fig. 1165
9. No. 4 Emco Meter with Combined Record Gauge
10. Emco High Pressure Balanced Valve Regulator, Pilot Loaded
11. No. 3 Emco Meter with Combined Record Gauge
12. Nordstrom Semi-Steel Valve, Short Venturi Pattern, 125 lb, Wrench Operated, Fig. 143.
13. Emco Field Regulator
14. Nordstrom Service Cock, Fig. 1014
15. Emco Ejector Service Regulator
16. No. 00 Emco Aluminum Meter
17. Emco "1001" Regulator
18. Nordstrom Lock Wing Service Cock, Fig. 1018
19. No. 0 Emco Aluminum Meter
20. Emco Appliance Regulator
21. Emco Low Pressure Balanced Valve Regulator
22. No. 4½ Emco Pressed Steel Meter with Emcorector
23. Nordstrom Steel Valve, 150 lb, Wrench Operated, Fig. 1925
24. Nordstrom Semi-Steel Valve, 125 lb, Gear Operated, Fig. 1169
25. No. 4½ Emco Pressed Steel Meter with Standard Index
26. Emco 10 lt Tin Meter
27. Emco 5 lt Tin Meter
28. Crawford Regulator
29. No. 5 Emco Pressed Steel Meter with Standard Index
30. No. 1 Emco Meter
31. No. 2 Emco Meter
32. No. 2½ Emco Meter

FROM PRODUCER TO CONSUMER

Norton Keys to Long Generator Life:

Crystolon key brick for door arch

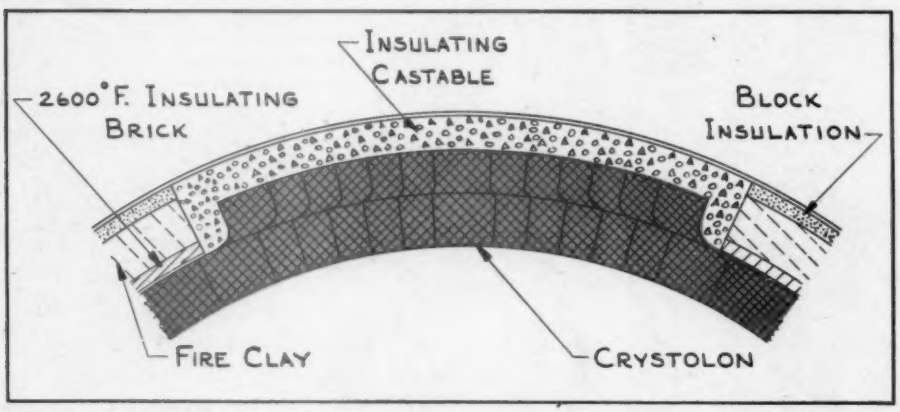
1. CRYSTOLON* Shapes

Crystolon shapes are made of the highest quality Norton silicon carbide plus a minimum of refractory bond. They are true to size and shape. Crystolon shapes possess high refractoriness and great strength at elevated temperatures and they have a remarkable resistance to abrasion, to spalling and to both the chemical and physical action of molten slag. Slag may adhere to the surface to a very limited degree but what does stick is very easily removed without harming the surface of the shape.

*Trade-mark Reg. U. S. Pat. Off.

2. Correct Design of Door Arch

Norton doors have a record of long life and trouble-free service due to an original design which has proved its serviceability in all Norton installations over a period of more than 16 years. The special Norton door arch shapes are radial in two directions to provide maximum wedging or keying. Furthermore, they are cut away (see illustration above) at the rear to reduce heat transfer to the shell. Due to the rugged design of Crystolon shapes, door arches properly installed usually last 6000 to 8000 hours.



Cross-section drawing of Crystolon door arch shapes and insulating materials

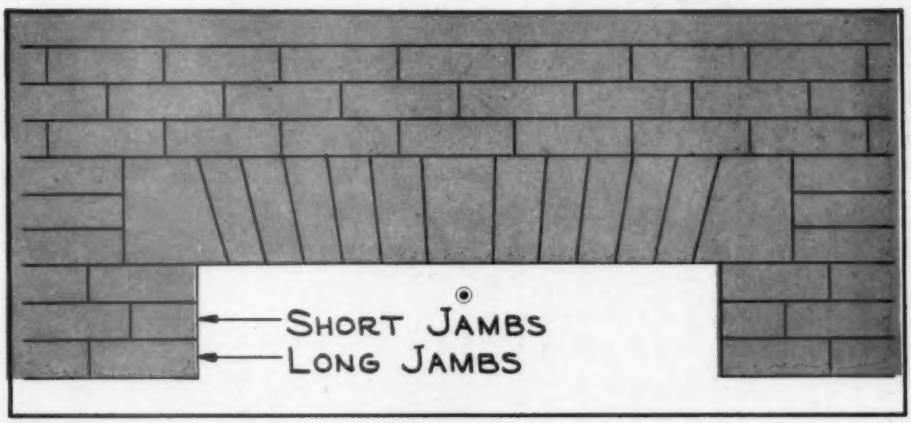
NORTON Norton Company • Worcester 6, Mass.

3. Installation Know-How

Typical Norton generator lining

The experience of Norton refractories engineers in directing the installation of hundreds of gas generator linings around the country has developed a fund of important knowledge about the proper design and installation of Crystolon linings. For example, door arches should be set in place dry with the key brick raised about 1½". The skew brick must be level both vertically and horizontally to insure proper fitting of the arch shapes. The brick work between the doors should next be cemented in place, then the special arch shapes are removed, cemented and replaced, still leaving the key brick to be driven in place.

Drawing showing face of Norton Crystolon shapes with thirteen arch shapes in position



Free Booklet

Many helpful hints (like that on proper door treatment given above) may be found in a booklet just prepared by Norton refractories engineers and which we will be glad to send you at no obligation. Write for our booklet "Relining and Repairing Gas Generators" to Refractories Division, Norton Company, Worcester 6, Mass.

Can't be beat for handling heat!

NORTON
REFRACTORIES

GMV Turboflow Saves Fuel For Big And Little Big Inch

As indicated on this map of the Inch line, 5 of the 7 new stations powered by reciprocating engine-driven compressors are GMV-equipped — a total of 46,900 Cooper-Bessemer V-angle hp.

Of particular significance, the GMVs most recently furnished (29 of the 44 now on the lines) are *Turboflows* — Cooper-Bessemer's latest gas-engine development, affording a full 10% increase in power output while reducing fuel consumption by at least 15%.

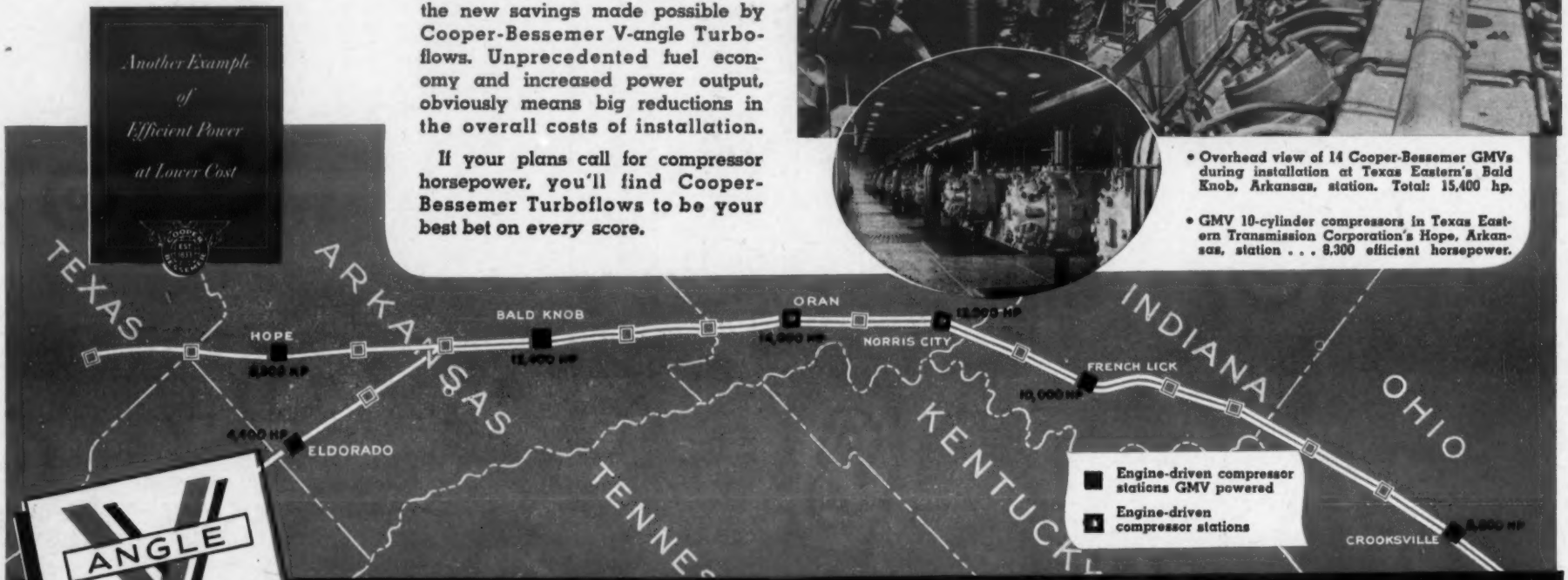
Today, more and more of the big gas lines are taking advantage of the new savings made possible by Cooper-Bessemer V-angle Turboflows. Unprecedented fuel economy and increased power output, obviously means big reductions in the overall costs of installation.

If your plans call for compressor horsepower, you'll find Cooper-Bessemer Turboflows to be your best bet on *every* score.

• Overhead view of 14 Cooper-Bessemer GMVs during installation at Texas Eastern's Bald Knob, Arkansas, station. Total: 15,400 hp.

• GMV 10-cylinder compressors in Texas Eastern Transmission Corporation's Hope, Arkansas, station . . . 8,300 efficient horsepower.

Another Example of Efficient Power at Lower Cost

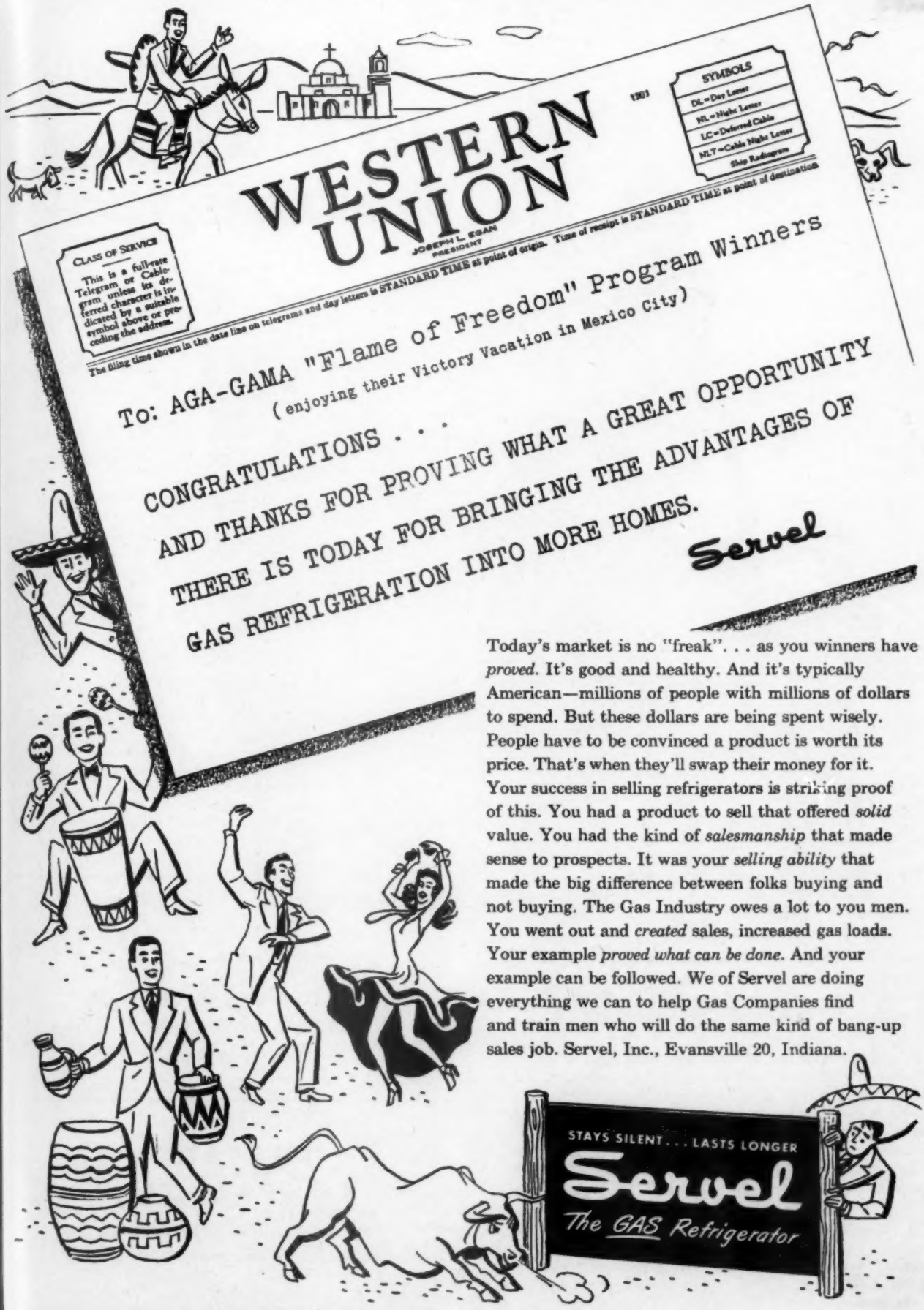


ANGLE V

Compressors by Cooper-Bessemer

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

New York · Washington · Bradford, Pa. · Parkersburg, W. Va. · San Francisco, Cal. · Seattle, Wash. · Houston, Dallas, Greggton, Pampa and Odessa, Texas · Tulsa · Shreveport · St. Louis · Los Angeles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NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
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This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.
The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination
To: AGA-GAMA "Flame of Freedom" Program Winners
(enjoying their Victory Vacation in Mexico City)
CONGRATULATIONS . . .
AND THANKS FOR PROVING WHAT A GREAT OPPORTUNITY
THERE IS TODAY FOR BRINGING THE ADVANTAGES OF
GAS REFRIGERATION INTO MORE HOMES.
Servel
STAYS SILENT . . . LASTS LONGER
Servel
The GAS Refrigerator

Today's market is no "freak". . . as you winners have *proved*. It's good and healthy. And it's typically American—millions of people with millions of dollars to spend. But these dollars are being spent wisely. People have to be convinced a product is worth its price. That's when they'll swap their money for it. Your success in selling refrigerators is striking proof of this. You had a product to sell that offered *solid* value. You had the kind of *salesmanship* that made sense to prospects. It was your *selling ability* that made the big difference between folks buying and not buying. The Gas Industry owes a lot to you men. You went out and *created* sales, increased gas loads. Your example *proved what can be done*. And your example can be followed. We of Servel are doing everything we can to help Gas Companies find and train men who will do the same kind of bang-up sales job. Servel, Inc., Evansville 20, Indiana.

All These Were Once

DUST COLLECTION PROBLEMS, TOO

48 Carbon Black Plants

203 Metallurgical Installations

205 Acid Plants

40 Paper Mills

270 Detarring Installations

216 Power Stations

73 Steel Plants

99 Oil Refineries and Miscellaneous Installations

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This experience enables Research Corporation to guarantee 95% to 99% cleaning efficiency of all kinds of manufactured gas . . . coke oven, carburetted water gas, producer gas, etc. Write for free booklet, giving valuable data.

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3 TONS OF WET TAR

RESEARCH CORPORATION

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122 South Michigan Avenue, Chicago 3, Illinois

AMERICAN Gas Journal
ESTABLISHED 1859

VOLUME 171 OCTOBER 1949 NUMBER 4

This month...

PROVIDING always that we don't consider it too rich for their digestion or an affront to our own middle aged morality, we always try to give our readers what they want in the way of editorial fare. This month the article by H. K. Richardson on page 16 dealing with the factors encountered in changing a glass making operation from the use of manufactured gas to mixed or natural was suggested by the general superintendent of a utility.

James H. McGourty's commentary on labor relations was the outgrowth of several suggestions that the whole subject of wages and collective bargaining be discussed with more specific attention to the gas utilities. Mr. McGourty keeps posted on wage contract negotiations all over the country, and promises us further material in future issues.

●

Deserved or not, we are cheered by an occasional accolade from an unexpected source. Edward W. Ackley & Co., Boston investment counsellor, mailed out 300 copies of "End of an Era"—leading editorial in the September JOURNAL—to investors, insurance companies and banks in the New England area. "I've received no end of favorable comment," Mr. Ackley writes. . . . Praise from Boston be praise indeed!

●

Looking through old volumes of the JOURNAL can become almost habit forming. But we liked the tempered restraint with which our mid-Victorian precursor hailed his own prescience in predicting the future of natural gas. Seventy-five years ago he wrote:

"It is now several years since a belief was set forth, editorially, in the columns of this JOURNAL —as in a matter already demonstrated—that throughout vast districts of the United States, 'an immense number of fountains of natural gas may be developed; furnishing a fuel which is independent of seasons, circumstances, miners' strikes, railroad monopolists, etc.'" — AMERICAN GAS LIGHT JOURNAL, May 16, 1874.

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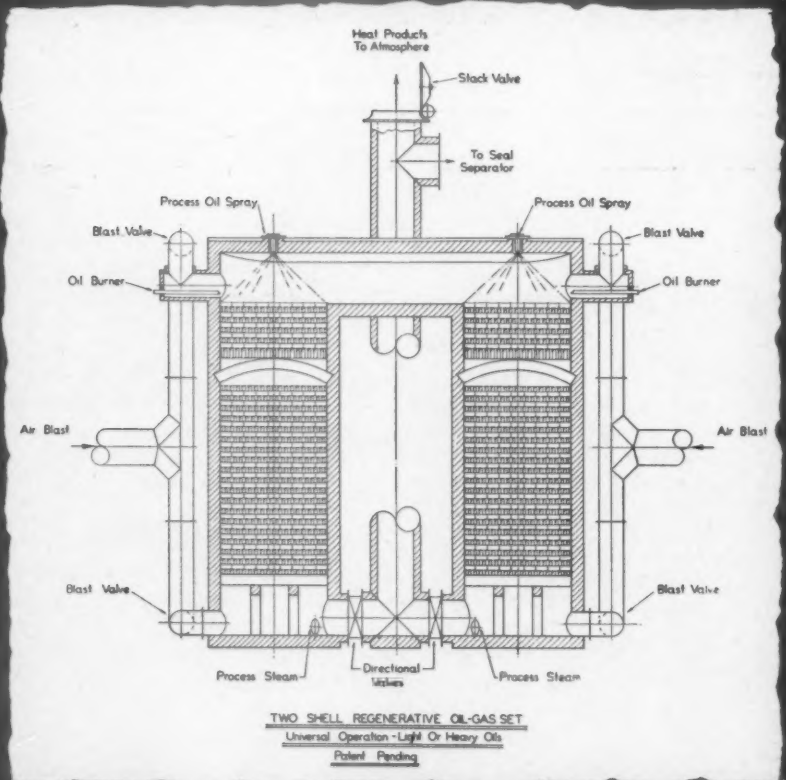
The Latest in Oil Gas Generation



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Universal Operation - Light Or Heavy Oils
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1. Designed expressly for high efficiency Bunker C Oil operation.
2. Can operate with any grade of gas-making oil with increased efficiency.
3. Lowest investment cost per therm of daily generating capacity.
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5. Low manpower requirements for operation and maintenance. Eliminates handling of solid fuel, ash and clinker.
6. Quickly started — dependable 24-hour operation.

The Gas Machinery Company has a background of over 25 years' experience with oil gas generating equipment, including the well-known HI-BTU Processes.

Recent A. G. A. Research — sponsored by Edwin L. Hall — has resulted in published data, establishing the practicality of using high-carbon oils by application of regenerative principles.

New GASMACO oil gas equipment is fully regenerative. It operates on a new, streamlined cycle. Installations are currently under construction. Why not investigate the possibilities in your using low-cost oil NOW?

Send for Bulletin A-203 and other information . . . or call in the GASMACO Engineer to discuss your requirements.

THE GAS MACHINERY COMPANY
16114 WATERLOO ROAD
CLEVELAND 10, OHIO

Designers • Fabricators • Erectors
Gas Plant Equipment and Industrial Furnaces

Editorial:

Preface to Planning

THE introduction of natural gas into the great metropolitan areas of New Jersey and New York, and its almost certain extension into New England within less than two years, will pose new problems for state regulatory authorities which they must be prepared to face, and on which an early and clarifying indication of policy would be greatly in the public interest.

All of the commissions south and west of the Connecticut line have had experience with the regulation of natural gas utilities, it is true. But historically most of this experience has been in regulating the rates, the accounting practices and the conditions of service of gas companies that have had the same basic type of operation since they were first founded. If they were manufactured gas distributors, they remained manufactured gas distributors; and if they were in the natural gas group, that was where they stayed. As increasing consumer demand called for the building of more facilities to produce or deliver gas, the rate base on which new tariffs were estimated was allowed a corresponding expansion. And the net trend over the years was always better gas service at constantly lower prices to the public.

Gas consumers in the East are expecting two things when gas reaches their area in quantity: They are expecting better gas; and they are expecting cheaper gas. Every newspaper story that appears—and the new fuel is enjoying an excellent press—anticipates those two benefits.

Hugh H. Cuthrell, next president of the American Gas Association, stated categorically what every gas customer has long suspected, when he said: "It seems to me one fundamental economic truth bears repeating: That is the simple fact that natural gas can be put down on this Atlantic seaboard cheaper than anything we can manufacture" and, "We must find economies, particularly in peak load production, and we must pass these economies on to the ultimate consumer."

It is true that it has yet to be demonstrated that a balance of utilization can be developed that will enable the East to get all of the natural gas it wants, for every purpose, and at the same time maintain line load factors that will enable the transmission companies to supply all of the gas at economical rates.

We recall that when natural gas was first extended into the Midwest and up along the Pacific coast, most of the companies at first decided to retain their old manufactured gas plants either as standby equipment, or to meet emergency peak load demands. Yet where are those plants today? Mostly junked! Of course at that time there was not the demand for peak shaving that exists today. And since the new high Btu process had not even been developed, no thought was given to interchanging or mixing natural gas with a manufactured product of an approximately equal heat content.

Manufactured gas companies receiving natural gas since the war, however, have been extremely reluctant to close down their old coke ovens and water gas facilities. Numerous reasons have been assigned for this: For peak shaving; as a supply safety factor in the event of line failure, and because of the cost of complete conversion of all appliances.

Nor can we overlook the powerful resistance to change that has characterized the coal and coke industry. All over the East, in and around Pennsylvania, New Jersey, New York and through New England to Boston, there are large merchant and utility coke plants that stand to be wiped out of business when the full impact of natural gas is felt in their markets. According to the Federal Power Commission, the demand for water gas coke in the New York metropolitan area alone will fall off by 700,000 tons annually when natural gas reaches there in 1950-51.

But we believe the major factor in gas company indecision as to change-over (and it cannot be accurately classed as anything but indecision) is the problem of what will happen to the rate base if the large investment in gas making equipment is reduced or written off through conversion to high Btu mixed or straight natural gas.

This is where the attitude of the public service commissions becomes the paramount factor in determining how soon and how universally the full value of natural gas will be made available to the public.

Three alternative courses of action appear to be open to the state regulatory commissions, where manufactured gas utilities want to transfer a large part or all of the operation over to natural gas. They may: (1) Permit them to retain all of their gas plant investment in their rate base; (2) Allow gas companies to amortize over a reasonable period property no longer used and useful or; (3) Force all gas companies to immediately write off all unused property pertaining to the manufacture of artificial gas.

Unquestionably there are gas utilities that did or will postpone conversion to natural gas because of a fear of the third possibility. A mandatory and immediate write-off of a major portion of any company's investment would have a far reaching and adverse effect on that utility's securities. It could so effectively depress the market as to make any long range equity financing difficult if not impossible.

The whole future of the gas industry in regions newly opened to natural gas rests on the most meticulous and intelligent long range planning. Sound economics and engineering must dictate and delineate the course of that planning, unhampered by political whimsy and untrammeled by regulatory indecision.

Elliott Taylor

Gas Change May Require Unusual Skill To Effect Efficient Utilization

Glass Working Units Point Up Problem

by H. K. Richardson

Mr. Richardson is a glass technologist and development engineer, with 28 years experience in the lamp division of Westinghouse Electric Corp. He is the author of several papers on the flow of glass through orifices and the design of burners for glass working. He is at present consultant to the Public Service Co. of N. J. in the conversion of numerous industrial process from manufactured to mixed gas. Another assignment is to effect the conversion of a glass working plant on the lines of the New York and Richmond Gas Co., Staten Island, from manufactured to straight natural gas.

●

TO the man using gas to shape and fabricate glass on a commercial scale, especially with high speed lamp making machinery, gas is not just gas. Each kind of gas burns just enough differently so that special burners and skill may be required for economical utilization. When a change is made from manufactured gas to natural gas, or to a mixed gas, the one most seriously affected and the one that complains the most is usually a glass working unit.

In all high speed lamp factories the shape and temperature of the gas flame is of prime importance. When heated, glass progressively softens, and scientifically speaking its working range is usually between the viscosity values of Log 3 and Log 5 (Poises). This corresponds to a change in viscosity in the working range or a change in the stiffness of 100 times and means a temperature change of 500°F during which the viscosity doubles every 10°F. This indicates how sensitive a piece of glass is to the application of heat.

The operations involved in assembling a glass incandescent lamp are shown in Figure 1. The viscosity relationships are given in Table I.

The problem is to apply a definite amount of heat, at the right temperature, at the right place, all at the right time to assure low operating losses. Several relationships are involved in this application, but this article will be confined to those affected by a change of gas composition—from manufactured to natural.

Gas Flame Characteristics—Figure 2 pictures the various parts of a flame and burner.

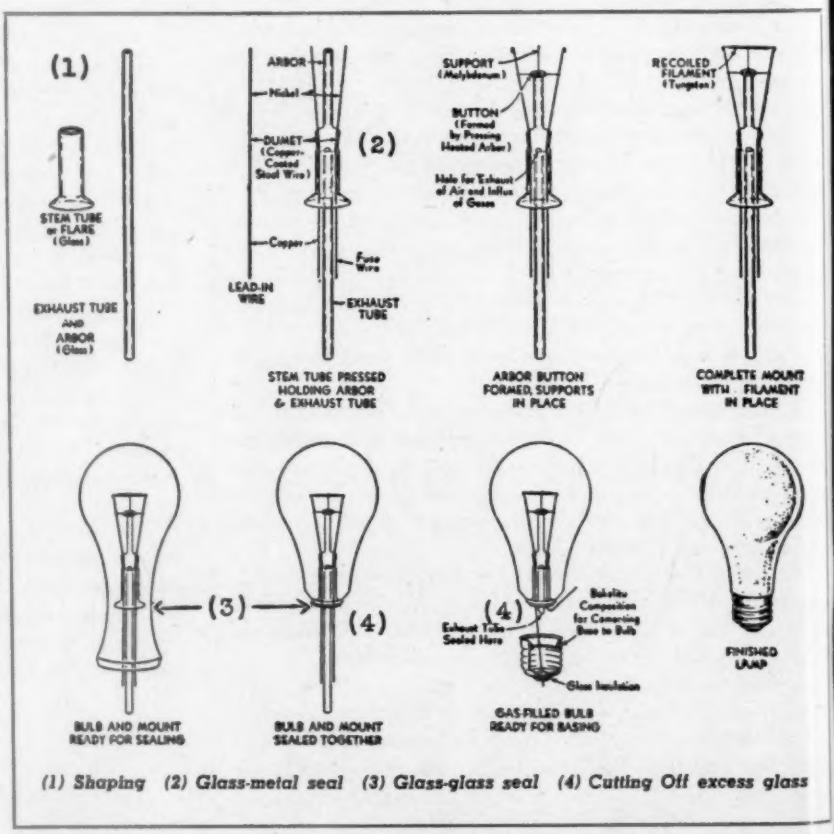
The burning characteristics of gases which are affected by composition, their scientific basis and the effect they have on burner design and operation are:

1. *Flame Shape—Focal Length*

The relation of the burner to the work is fixed by the design of the machine. Consequently, this requires that the right amount of heat be applied to the right spot. This means that the focal length of the flame is definitely expected to be fixed.

2. *Flame Temperature*

This is desired to be as high as possible at the point of application.



(1) Shaping (2) Glass-metal seal (3) Glass-glass seal (4) Cutting Off excess glass

Fig. 1—Steps in assembling mount and completed lamp.

3. *Flame Character—i.e. Oxidizing or Reducing*

Lead glass blackens with a reducing (gas rich) flame and Alumina glasses cloud up with an oxidizing (air rich) flame.

4. *Heat Release*

The time of working in some operations is four seconds, rarely more than 30 seconds, so the Btu release per minute is an important item in the use of the gas.

These factors are influenced by two characteristics of the gases and their air mixture. (The usual air gas ratios of the burning mixtures used for glass working range from three to five parts of air to one of gas for manufactured gas, and from eight to thirteen parts of air to one of gas for natural gas.)

1. *Rate of flame propagation or ignition velocity*—In this work the ignition velocity of a free flame is used. This is plotted for the range of useful air gas ratios in Figure 3.

2. *Flame temperature of the gas air mixtures*—Figure 4 shows the variation of the flame temperature of natural and carburetted water gas over the usually used air gas ratios. These measurements are comparable since they were made by the same observers.

In the conversion of manufactured gas to natural gas the above factors of flame propagation and temperature have a marked effect on three things;

Actual burner designs—particularly pilotage.

Heat release for definite areas of ports (a factor in actual burner design, but so important as to be noted separately).

Operator's handling of the burner adjustments.

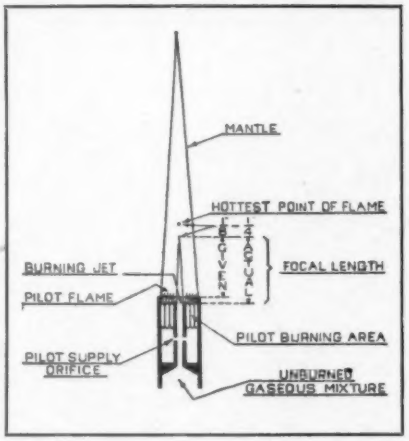


Fig. 2

Burner Design

All burners used in the most sensitive parts of lamp glass working are piloted burners (Figure 2)

Pilotage or Pilot Ratio for Different Gases—Due to the slower flame propagation of natural gas (Figure 3) it is necessary to have a larger per cent of pilot flame and a larger pilot burning area to burn this gas than for manufactured gas. This relationship is shown in Table 2.

This indicates that in any complete conversion to natural gas, a general revamping of the burners is needed. Some of the details of these changes will be given later.

Heat Release of Ports as Affected by Different Gases

The practical effect of this factor is seen from Table 3 where the heat release in Btu of natural gas at the usual air gas ratios is about 60 per cent of that of manufactured gas.

When these two factors are applied to burner design, we come up against the fact that the machine construction is fixed and made for a definite flame length. Since in practice the slower flame propagation of the natural gas places the working point of the flame out further from the burner tip, trouble arises. The effect of the two gases on focal length is given Table 4.

Thus, it is necessary to reconcile the following factors: Btu release per port area, focal length, and the effective flame temperature at the point of use. To get the heat release needed approximately 60 per cent more port area is required with natural gas than with manufactured gas. This means longer flames with the same port diameter so more ports of smaller diameter are called for.

Also, the pilot burning area must be increased to about double with natural gas. Thus a burner of dimensions too large for its place on the machine may be the result and a small burner compromising the port area, the per cent pilot supply and the pilot burning area must be worked out. The result while usable is rarely perfectly satisfactory.

The difference in appearance of natural gas and manufactured gas burners of the same capacity is seen from the examples in Figure 5.

Operator's Handling of Burner Adjustments

The ordinary firesetter on a glass working machine using manufactured gas which is changed over to natural gas has several technical factors to face which require a change in his thinking since all the adjustments require more careful handling.

Reference to the curve in Figure 4 shows that if an operator for instance

Table 1

Operation on Glass	Factory Operation	Glass Type	Approx. Viscosity Temp. °C.	Log
1. Shaping	Flare making	Lead	800	5.5
2. Sealing glass to metal	Stem making	Lead	1000	3.8
3. Sealing glass to glass	Sealing-in	Lime to lead	1050	3.5
4. Cutting off excess glass	Cullet cut-off	Lime	1140	3.3
	Tipping Exhaust Tube	Lead	1100	3.3

Table 2

Gas	Maximum Flame Speed Ft./Second	Flame Pilotage % of Port Area Range	Average	Ratio Pilot Burn. Area Port Area Range
Mfg.	2.2	10-40	25	8-12
Natural	1.0	50-200	90	20-30

Table 3

Gas	Btu of Gas	Heat Release in Btu/Hole/Hour Air-Gas Operation (M.T. Drill Size) 33	55	64	71	78
Mfg.	525	5000	1050	525	263	100
Natural	1050	3000	630	315	158	60

Table 4

Burner Jet Drill Size No.	Approx. Focal Length in Inches Mfg. Gas	Nat. Gas
55-56	2½	3¾
62	1½	2¼
71	½	¾

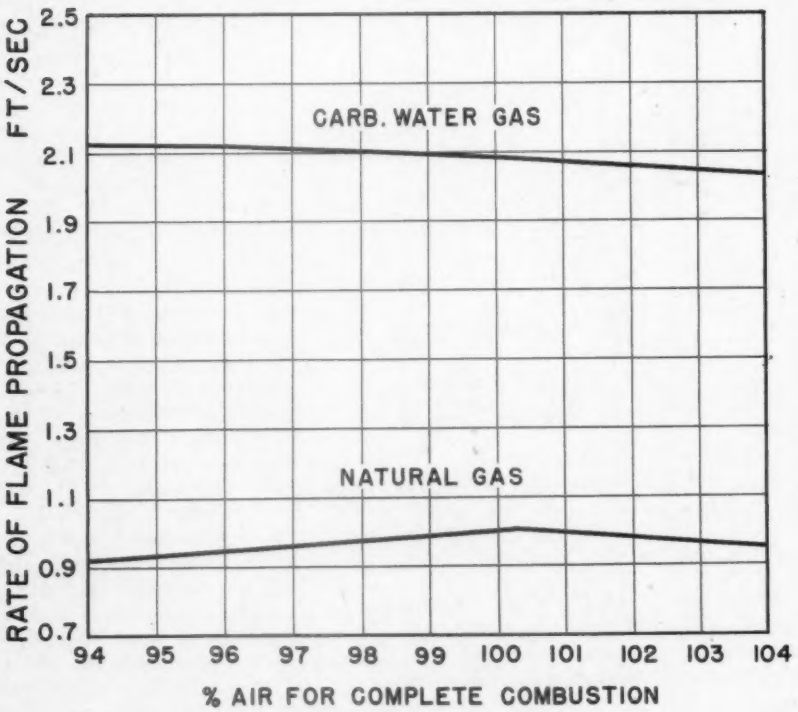


Fig. 3—Flame propagation of gas air mixtures in range used for glass working burners.

was accustomed to use a flame temperature of 1960°C and above for a job using manufactured gas, he could use a gas-air adjustment of 94.7 per cent to 101.8 per cent of the air required for perfect combustion, whereas to get the same temperature in natural gas he would be limited to a range of 98.9 to 100.3 per cent. When the change is made to natural gas, the range of his adjustment is reduced from 7.1 per cent (101.8 less 94.7) to 1.4 per cent (100.3 less 98.9) so he must be much more careful and skilled in his work when using natural gas. This range is further reduced if a reducing or an oxidizing fire is needed. This situation is a very disturbing one on the operator's thinking and requires a new outlook on the job.

To complicate matters further the maximum flame temperature obtainable with the natural gas is approximately 40°C (72°F) cooler than with manufactured gas.

Miscellaneous Factors in the Changeover

As noted before, in high speed equipment the time of application of the gas flame to the work is of very short duration. This means close pressure control of the gas supply at the machine, and is more important with natural than manufactured gas.

Specific gravity variation of the gas is also a cause of trouble. A change of specific gravity of .03 (i.e. from .62 to .65) will require the resetting of all gas valves on the glass working machine to avoid objectionable shrinkage, which means spoilage. Thus natural gas mixed from several sources and delivered during the factory working hours will be the subject of complaints. Where specific gravity variation on the direct sendout cannot be overcome, it is advisable to install storage tanks that may be filled during the night and drawn from during the working day.

Sulphur content of the natural gas—The sulphur content of manufactured gas of around 10 grains per 100 cu. ft. has been found to serve as a lubricant when making flares. See Fig. 1 (1). When blowing miniature bulbs, the molds also require similar lubrication.

When using natural gas without this sulphur, two means of supplying the deficiency are in use:

The first is vaporization of carbon disulphide (CS_2) into gas at the flaring pin position.

The second is the addition of sulphur dioxide (SO_2) gas by the vaporization of liquid SO_2 into the gas system. An automatic system of this type is available.

Venturi mixer—All glass working machine burners are supplied by the two pipe system, gas at about 18" wc and air at 4 psi. It has been found that these mixers must be more accurately tailored to the job in natural gas work than with manufactured gas.

Valves—To assist the fire setter in overcoming the higher Btu values of natural gas and help in the finer control needed, the gas and air valves should have finer stem threads than required with manufactured gas. In

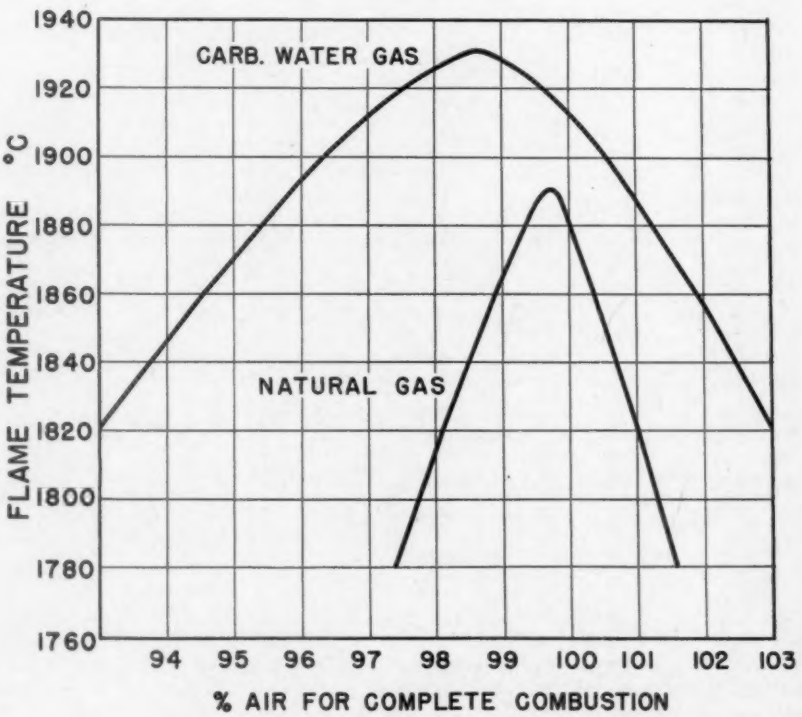


Fig. 4—Flame temperatures of various gas air mixtures in the range used for glass working burners.

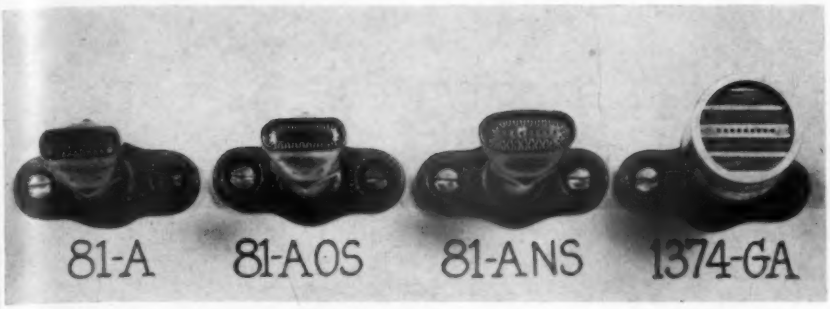


Fig. 5—These burner heads show the necessary increase in pilotage area as modified for use on 98 per cent methane. Burner heads (American Gas Furnace Co.) are 81-A for manufactured gas; 81-AOS for propane and mixed gases; 81-ANS for natural gas; and 1374-GA for natural gas of high methane content.

Effect When Tested on 98 per cent Methane

Burner head pressure before blow-off: 81-A, about ¼"; 81-AOS, about 1"; 81-ANS, about 10"; 1374-GA, more than 10". Approximate usable consumption of 98 methane, cu. ft. per hour: 81-A, none; 81-AOS, extremely small; 81-ANS, 3½; 1374-GA, 5.0.

natural gas work it is customary to use a 32 or 40 threads per inch of stem instead of the older 16 thread type or typical hose cocks.

Use of oxygen gas fires—Ordinarily no trouble is experienced when an oxygen gas job is changed from manufactured to natural gas. In fact, the change is usually beneficial for the oxygen-natural gas flame is hotter than the oxygen-manufactured gas flame—i.e. 5135°F vs. 5050°F.

Summary

In the foregoing discussion the factors needing attention when the gas supply is changed from manufactured gas to natural gas are given. However, in many instances where the operation uses the full flame temperature of the manufactured gas-air mixture, it will be necessary to add some oxygen to the natural gas-air mixture to keep up the production rate. This addition of oxygen accomplishes two things; 1. increases the effective flame temperature, and 2. shortens the focal length of the flame.

In installations where the sendout is a mixture of manufactured gas and natural gas with or without reforming the troubles of the full substitution will be encountered but in a lesser degree. These troubles will be in proportion to the reduction in the percentage of hydrogen and the increase in the percentage of methane in the sendout gas. The reduction in hydrogen and increase in methane both work the same way i.e. to reduce the flame temperature and increase the focal length of the flame. The effect of these two components can be seen from their characteristics in Table 5.

When using gases of 530 Btu, 600 Btu or 800 Btu, both flame temperature and flame length troubles show up. It is therefore wise to change burners to those found best for straight natural gas. Burners designed for straight natural gas burn well on any of the mixtures, giving greater Btu release. Only one difficulty arises: If burned at low rates or with gas rich flames, the pilot areas are very likely to burn a bright red and require early replacement.

When changing from manufactured gas to straight natural gas on lamp working machines, it has been found that about 10 per cent more Btu are required with the natural gas to do the same work.

Table 5

Gas	*Max. Flame Speed Ft. per Second*	*Max Flame Temperature Gas-Air Mixture*
Hydrogen	9.2	3713°F
Methane	.85	3416°F

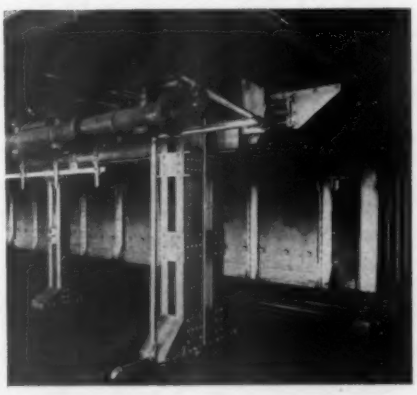
Vancouver Starts Battery of 24 Ovens

TWENTY-FOUR new coke ovens costing $750,000 started production of gas and coke last month at the Carrall Street plant of the British Columbia Electric Co., Vancouver, B. C.

Over a two-year period they will replace 24 existing ovens, six of which immediately were removed from service. The new ovens bring Greater Vancouver's total gas manufacturing capacity to a new high—17,750,000 cu. ft. per day. However, as the older ovens wear out during the next two years, capacity will gradually descend to 15,000,000 cu. ft. daily.

Coke produced at the rate of 60,000 tons annually will be used in BCE carburetted water gas plants at Vancouver and in Victoria.

Four sulphur-removing units and a napthalene scrubber are scheduled to begin operating in advance of winter weather.



Vancouver's new ovens—At the far right can be seen the recessed construction of the bench end walls.

The installation consists of 24—4.2 ton ovens which on a normal schedule will produce 2,750,000 cu. ft. of 465 Btu gas from local coal.

The plant is standard in construction and embodies several features which, though used in other sections of the carbonizing industry, are new at Vancouver. The bench end walls are of recessed construction which results in consolidation of the brickwork on expansion when heating up, the walls remaining rigid and fissuring and leakage are obviated.

Tie-rods at oven door level are water cooled, and the stretching and consequent weakening experienced with other types is avoided. Cooling water is taken from the city main (through an emergency storage tank) and outlet water may be used for boiler feed or similar purposes.

The bench is fully recuperative. That is, both producer gas and secondary air are heated in the recuperator by outgoing waste gases, prior to combustion in the heating wall. Further economies are made by providing waste heat boilers which make the plant entirely self-supporting as far as steam is concerned.

True Picture of Unaccounted-for Gas Shown by Line Loss Studies

by H. Emerson Thomas and Paul E. Peacock, Jr.

THE gas industry today is neglecting a very important economic factor which results in the throwing away of valuable income. This is especially true of the smaller companies.

We have worried about increased costs of gas making fuels, of labor, and other important operating factors, but have often overlooked the very obvious loss of revenue and profit through unaccounted-for gas. We have been lulled into a false sense of security by figures that are more reassuring than actual. Line losses are more important at this time than ever because of higher holder costs.

Our false sense of well being may have grown out of greatly increased sales during and after the war. These greatly increased sales have thrown a false light upon our unaccounted-for because so many of us figure unaccounted-for by a percentage of the gas send-out. When our gas sales have doubled or tripled we could have double or triple unaccounted-for increase, and we would still have the same per cent of loss. Under such conditions many have operated with serious line losses without attempting to do anything about it.

The industry is generally coming to checking unaccounted-for gas on the basis of leakage per year per mile of three inch main equivalent. Under this system it is generally agreed that when the leakage exceeds 150 Mcf per year per mile of three inch main equivalent, the leakage is excessive. By this "yard stick" a fair comparison of one property against another may be made regardless of property size or send-out.

Since the comparison of one property with another based on miles of mains is the only equitable basis for comparison, the authors have used this method in arriving at the figures given here. Because the problem being discussed is mainly of interest to the smaller properties, comparisons are made only of companies having an annual send-out of 200 million cu. ft. of gas or less.

Certain tables were made up of 116 properties east of the Mississippi River, excluding natural gas properties. An analysis of the tables shows that the New England properties are generally in good condition so far as leakage is concerned, so that group of properties will be left out of this discussion. This leaves 88 properties of which 50 are LP-gas properties and 38 are manufactured gas properties.

H. Emerson Thomas

Paul E. Peacock, Jr.

Mr. Thomas is President of H. Emerson Thomas and Associates, Inc., of Westfield, N. J., and Mr. Peacock is vice-president.

The authors have used all properties for which data were available in making up the comparative figures used in this paper. It was felt that this would be a good opportunity also to cover the losses of LP-gas properties versus manufactured gas properties.

Of the 88 properties covered, the combined send-out for the year 1940 (all properties did not have data for 1940) was 3,188,270 Mcf, while the loss was 14.4 per cent. The unaccounted-for per mile of main in 1940 was 208 Mcf.

Now we shall compare the same properties for the year 1947. The total send-out in 1947 was 5,409,128 Mcf, while the loss was 15.0 per cent. The unaccounted-for per mile of main in 1947 had increased to 339 Mcf.

Most operators check unaccounted-for by percentage, and an average property under such methods of checking, would consider the increase in leakage from 14.4 per cent to 15.0 per cent not serious. But let us check on the standard of loss per mile of main. Under this basis of checking the loss has increased from 208 Mcf to 339 Mcf which is an increase of more than 63 per cent and this *is* serious. At an estimated cost of $1.00 per Mcf, this increase alone will cost more than $350,000 a year, for the total mileage of the group of utilities studied in this area.

As pointed out, a comparison will be made of LP-gas properties with manufactured gas properties. The manufactured gas properties in 1947 had an average unaccounted-for of 343 Mcf per mile of main per year. The LP-gas properties in 1947 had an average unaccounted-for of 277 Mcf per mile of main per year, or an average loss of 66 Mcf per mile of main less than the manufactured gas group. This is positive proof, not only that the LP-gas property is no worse than the manufactured gas property in line loss, but also that in the case of the 88 properties covered, the line loss is actually less with LP-gas.

We believe that the above facts will refute the fallacy which has grown up within the gas industry to the effect that LP-gas distribution systems are much higher in unaccounted-for than are manufactured gas systems.

Cost Means More Than $

We believe also that the above has clearly pointed out the seriousness of the unaccounted-for problem of the average gas distribution system today. However, the "cost" is not limited to dollars alone.

The "cost" is great in loss of capacity in the distribution system at a time when the demand upon the system is so great. If we lose 15 per cent of our gas in leakage, we are reducing the capacity of our system by that much. This adds up to low pressure troubles and customer complaints which again increase our operating cost because of extra service calls due to the pilot outages, etc. We even lose customers because of the poor service which is a direct result of low pressure caused by line leakage.

Although most operators know how

	Unaccounted-for Gas—*Per Cent*		Loss per Mile of Main—*Mcf*	
	1940	1947	1940	1947
CENTRAL & EASTERN				
Manufactured Gas	15.32	13.55	273	338
L-P Gas	10.94	14.63	159	255
SOUTHERN STATES				
Manufactured Gas	12 32	16.08	185	351
L-P Gas	15.88	17.05	197	311

The table at the left indicates that for the central-eastern group, manufactured gas properties showed a reduction on a per cent of line loss basis, but a 24 per cent increase on a loss per mile of main basis.

As for the southern properties, the authors point out, for the period covered the per cent loss of LP-gas is higher, but on the loss per mile of main basis, the manufactured gas property has the more serious problem. In each case, they say, the loss per mile of main is more than double the leakage accepted as maximum for sound operating practice.

to locate and repair leaks, we would like to point out some of the obvious sources of loss and some methods of correcting.

Locating Leaks

1. For a number of years one of the most economical methods of leak detection has been the soil and vegetation method. A number of properties which received splendid results from the first few surveys of this type have reported poor results from succeeding surveys. This has not been because of an error in the method, but rather to the fact that surveys can be conducted at too fast a pace.

Many of the surveys have been conducted from an automobile in order to speed up the work, while best results could be obtained by making the survey on foot. When making the survey from automobile, only the most obvious leaks can be located, while by making the survey on foot the engineer can observe the soil and vegetation from curbing to the house and building. This would cover the service lines as well as the mains. The engineer also should pass down each side of the street to observe both sides.

2. The next method of leak locating is the old "stand-by," the bar hole test. While this method is slower and more expensive, it is still the most thorough and dependable when conducted properly. To get satisfying results, the bar test hole should be right over the main or service and within the old ditch. To make such a survey you must have dependable records and measurements or a good pipe locater. One of the greatest objections to the bar hole test method is the cost of drilling pavement. However, this need not be the case even with small companies which do not have their own compressor. Most towns have contractors or others that will rent an air compressor and drilling tools at a rate far cheaper than hand drilling.

One point to watch for in bar hole tests is that with LP-gas a leak is apt to be up-hill from the test hole where the gas was observed, while with manufactured gas the leak is apt to be downhill from the test hole.

In addition to the above there are various miscellaneous methods of leak locating which include several types of listening devices used at service taps and other points, and the sectionalizing methods. Under the former various instruments with amplifying equipment pick up the sound waves created by gas leakage through an opening in the line and registers the sound in earphones. Under the latter system, a section of a system is isolated by shut-off valves and the valves are closed at all except one connecting point. The gas entering the section is then metered at off-peak hours to register any undue amount of gas going into the section.

At best the above methods tell only that you have leakage in a given section or area and you still have to resort to the bar hole test method to locate the actual point of leakage.

Repairing Leaks

Let us assume now that you have applied some method of leak locating and have found your leakage. Your job is now one of repair. We will cover briefly some of the points of repairing several types of lines.

Cast Iron Mains: If your leakage is with cast iron mains, the more obvious cause is through drying out of the jute packing in the caulked joints. If this is the case, the leakage can be overcome or materially reduced by application of a chemical for expanding the jute material. This chemical can be used in several ways, while the most inexpensive is the fogging method. This method is recommended in cases where early treatment is given the system, but due to the slowness in covering the system and thoroughly treating the joints it is not recommended for immediate severe leakage problems.

A gravity system of treating mains is fine where the topography is such as to allow placing the chemical in the system at a high point and then allowing it to flow by gravity to a low point where any surplus material is reclaimed at a drip. If the chemical can be "trickled" into the main over a period of several days, it will give a more thorough treatment. As the chemical flows past each joint, a small amount is left in the depression at the joint to be attracted to the jute by capillary action until the entire jute joint is impregnated. If a quick treatment is given, it is likely not enough chemical will be left in the depression to treat the entire joint and a large part of the treatment value will be lost. In such cases a second or even third treatment is necessary.

Another method of application is the spray. By this method you use a pressure tank and a long hose with spray nozzle at the end. The hose and nozzle are fished into the main by a steel tape through a tap hole in the main and the pressure applied to the spray as the operator draws the tape and hose back out. Complete instructions for this method of treatment may be obtained from manufacturers of the chemical.

When a system is converted to LP-gas or any dry gas, the authors have long recommended that an immediate treatment be begun using the chemical by the fogging method. This treats the cast iron joints before they give trouble; coats the inside of the mains and services to "lay" any dust that may be present; and has some beneficial result on meter and regulator diaphragms. The rate of fogging must be closely controlled to prevent formation of a composition similar to gum in orifices, etc. For this reason, it usually takes up to two years to treat thoroughly an average system.

Steel Mains and Services: A large part of most gas systems is usually of steel pipe and the chemical described above will have no value other than that of perhaps dust "laying."

The usual leakage in steel pipe is due to rust or pit holes in mains or services. If the leak is just that of an isolated pit, it is rather simple to repair the leak with an appropriate leak clamp. Bear in mind, however, that where you find one or two leaks in a

(Continued on page 56)

Lenders Express Divergent Views on Debt Financing Policies

by John F. Falvey

John F. Falvey

THE natural gas industry has been critized on numerous occasions during the past several years because of an allegedly disproportionate ratio of its funded debt to its total capitalization.

Speaking before the American Gas Association last October, Edmond M. Hanrahan, chairman of the Securities and Exchange Commission, warned of the dangers inherent in weighty capital structures. "Serious problems do not, of course, arise," he said, "when a natural gas company increases its debt ratio from 0 to 15 per cent or from 13 to 29 per cent. Indeed, it is just for the purpose of enabling management to meet expansion requirements that high common stock equities are maintained. However, when ratios begin to go from 42 to 59 per cent, from 50 to 70 per cent, from 40 to 65 per cent, or from 30 to 60 per cent, there is cause for uneasiness. It then appears that management is again looking backwards to the days of high leverage and that trading on the equity once again has allure. Should this trend continue, the industry will face the inevitable shakedown that follows prosperity with its capital structures heavily loaded with debt and with a high burden of fixed charges."

Somewhat similar conclusions were voiced early last month by Eugene Bashore, vice-president of the investment banking firm of Blyth & Co., Inc., at the annual convention of the Pacific Coast Gas Association.

Pointing out that more than half of the substantial capital outlays contemplated by the gas industry are proposed by natural gas transmission companies, "most of which have little cash left over after paying sinking funds on existing indebtedness and reasonable dividends," he warned that: "So abundant and so cheap is debt capital, there is great temptation to make maximum use of borrowing. The danger lies in over-borrowing. Too much debt not only interferes with the sale of junior securities, but it precludes further debt financing. If you borrow the maximum today when lenders are willing to loan at a high debt ratio, you will find you have cut off your only avenue of financing in the future when the pressure to loan is not so great."

Now comes a forceful argument stressing the opposite viewpoint, namely, that debt ratios of natural gas companies are not only not too high but that a high ratio is absolutely necessary to insure ability of trunk line transmission companies to obtain the equity money portion of their new financing.

This is the opinion expressed by one of the leading life insurance company lenders to the natural gas industry.

The criticism that pipe line capitalizations are top-heavy in debt apparently is based, the insurance institution believes, on the incorrect premise that what is an ideal standard for the electric utility industry (maximum debt ratio of 60 per cent and a minimum common stock and surplus of 25 per cent espoused by SEC) is necessarily the ideal and proper standard for the pipe line industry.

Fundamental Differences Exist

Such criticism is unjustified, it states, for several reasons. First, this criticism apparently does not recognize the differences between the electric industry and the natural gas pipe line industry and, perhaps even more important, the differences between individual companies in the natural gas pipe line industry. Fundamentally, the sound argument for a high equity ratio (and a low debt ratio) lies in the fact that in a period of poor business and declining earnings a company would be in a better position to escape financial trouble due to high fixed charges. The general rule has been the greater the degree of risk in a business the lower should be the debt ratio. Certainly a natural gas pipe line company which has "minimum take or pay for" sales contracts with distributing utilities of good credit standing, which minimum payments after operating expenses are adequate to take care of fixed charges and sinking fund requirements, has a much smaller risk factor than the average electric utility or another pipe line company which does not have such sales contracts and/or relies to a greater extent on industrial sales.

Stability Is An Element

In this connection it should be pointed out that the operating expenses of a natural gas pipe line company are very stable. One of the principal transportation costs is the cost of gas used as a fuel to run the compressor stations. Depreciation and general taxes are relatively stable and labor cost is very low, averaging only 12 to 15 per cent of gross revenues as compared to 20 to 25 per cent for the electric industry. Thus, earnings of natural gas pipe line companies have an element of stability which is probably greater than that for any other industry of major importance. It is the above factors which make possible a highly accurate estimate of future earnings. In view of the above it seems impractical to apply any fixed yardstick or ratio as a measure of a sound or unsound capital structure—the individual facts of each case must be considered.

Secondly, the funded debt issues of natural gas pipe line companies brought to market in the past several years have sinking fund provisions which provide for complete retirement by maturity and a rapid lowering of the debt ratio. In this connection it should be noted that cash sinking fund provisions in electric utility bond issues actually are the exception today.

Thirdly, it should be emphasized that the pipe line debt is based on a fundamentally sound industry—one that involves the transportation of a basic resource from where it is avail-

(Continued on page 24)

Index of Yields : Selected Utilities Stocks

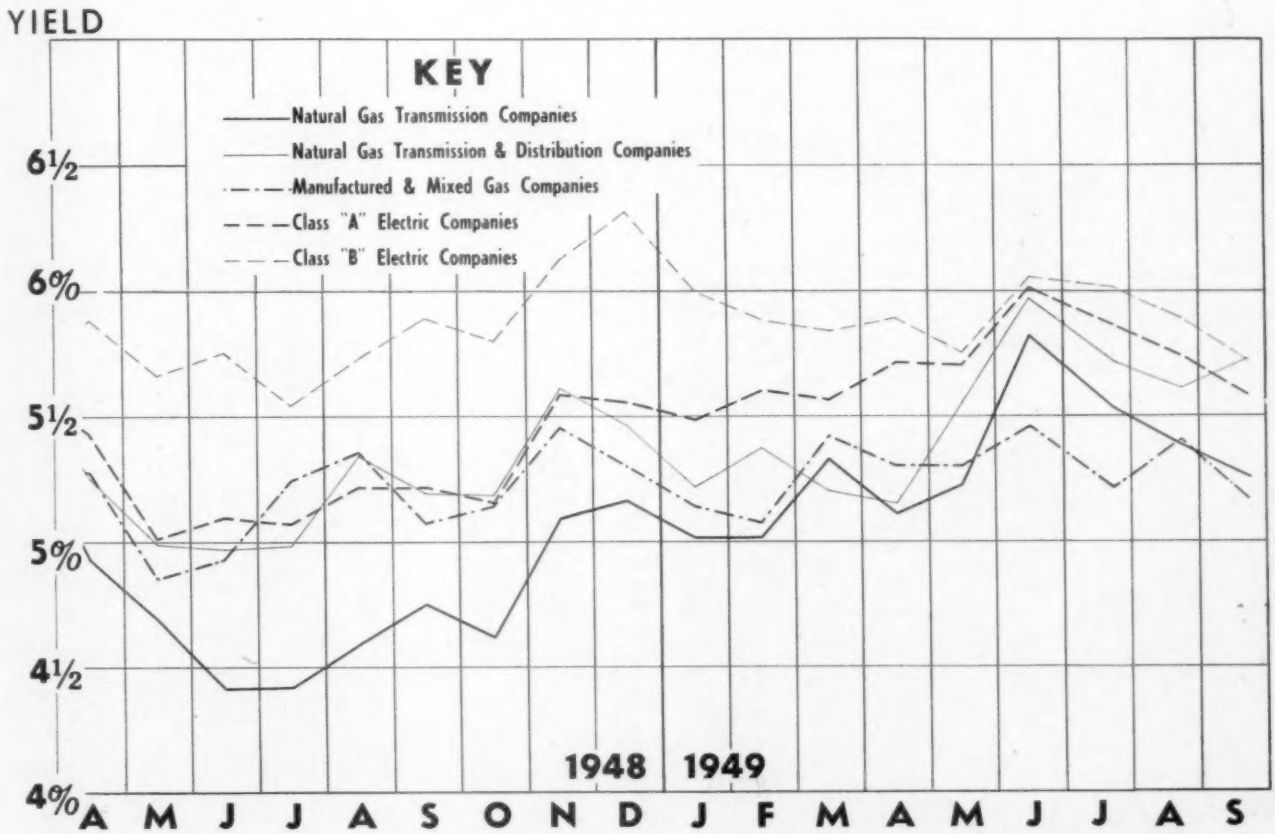
AGAIN the yield return obtainable on the stocks comprising the AMERICAN GAS JOURNAL index shows a trend to lower levels. The sole exception is the natural gas transmission and distribution group but even here the recovery in market prices now underway indicates that they will not be out of line for long.

The reason for the further pinching of yields is not difficult to ascertain. Dividend news has been favorable, earnings of the individual companies in the gas industry are trending higher, and earnings prospects are considered by investors to be favorable for both groups.

Stimulated by the disparity existing with prices for competitive fuels and by sharp expansion programs still underway, the natural gas companies as a group are expected to reveal further earnings gains. Manufactured gas companies are still being aided by higher rates and lower operating costs.

The most significant development currently favoring utility common stocks has been the success attained by the electric companies in bringing down a far greater proportion of revenue dollars to net income than heretofore. In July net income represented better than 24 per cent of revenues, compared with less than 20 per cent in June and 16 per cent in April. Any further improvement in market prices for electric utility stocks on this score should find reflection in greater demand for gas industry equities. Natural gas companies also are doing well for themselves from the standpoint of earnings, the transmission companies at last report bringing approximately 20 per cent of revenues down to net and the transmission and distribution companies following close behind with nearly 14 per cent.

Leading advisory services, while not unanimous in their opinions, on the average are taking a more optimistic view of the outlook, the majority holding to the viewpoint that stocks, rather than cash, currently represent the more logical media to hold.



Method of Compiling Index of Yields

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

The companies used in compiling this index are:

Natural Gas Transmission Companies: El Paso Natural Gas Co.; Northern Natural Gas Co.; Panhandle Eastern Pipe Line Co.; Southern Natural Gas Co.; Tennessee Gas Transmission Co.

Natural Gas Transmission and Distribution Companies: Columbia Gas System, Inc.; Consolidated Natural Gas Co.; Lone Star Gas Co.; Oklahoma Natural Gas Co.; Pacific Lighting Corp.

Manufactured and Mixed Gas Companies: Bridgeport Gas Light Co.; Brooklyn Union Gas Co.; Laclede Gas Light Co.; Peoples Gas Light & Coke Co.

Class "A" Electric Companies: Boston Edison Co.; Commonwealth Edison Co.; Houston Lighting & Power Co.; Southern California Edison Co., Ltd.

Class "B" Electric Companies: Dayton Power & Light Co.; Hartford Electric Light Co.; Pennsylvania Power & Light Co.; Public Service Co. of Colorado; San Diego Gas & Electric Co.

(Continued from page 22)

able to where it is needed with little if any competition in the transportation phase itself and in the sale of the transported product.

In addition it might be pointed out that the high debt ratio and the resulting leverage have increased the income available for the equity considerably above the six per cent return allowed by regulatory authorities. Two hypothetical examples will illustrate the point. In both examples we will assume earnings on the total capitalization at six per cent, and interest on the debt at 3½ per cent. With the capitalization ratio evenly divided at 50 per cent each for debt and equity, earnings on the equity would be 8½ per cent. But with the capitalization ratio at 75 per cent for debt and 25 per cent for equity, earnings on the equity would be 13½ per cent.

This leverage factor has made equity securities of pipe lines more attractive, and, as a consequence, it has enabled the gas pipe lines to raise more easily the necessary venture equity to partially finance the construction of the new pipe line facilities and to provide a cushion for the debt. Without a high debt ratio in the first place, then, there is some question as to whether some of the gas pipe lines would have been able otherwise to raise the necessary funds to undertake the enterprise, particularly under conditions existent in the equity markets since the end of 1946. Statements to this effect have been made by important members of the investment banking industry. Inasmuch as the construction of the pipe lines has been in the public interest, the important life insurance company concludes, this would have been regrettable.

High debt ratios are not bothersome, qualified observers say, so long as rising sales volumes continue. They will become a headache only when markets for gas suffer. That is when industrial plants are down, and when there no longer is a need for the full amount of gas now flowing through the transmission companies' mains.

Reserves Have Worth

They state further that to a considerable extent depreciation accruals now being set aside give the pipe line companies funds with which to take care of amortization.

In a limited number of situations, they state, furthermore, that gas reserves owned by the individual companies if capitalized at their true worth would have the instant effect of sharply reducing what now appears to be an unduly high ratio of funded debt to total capitalization and surplus.

Investors in pipe lines have not been dismayed. Proof of this is afforded in the low yield return obtainable on natural gas equities as a whole.

Common shares of the leading pipe line transmission companies provided an average yield of only about 5.2 per cent at present market prices. The highest yield obtainable in this classification, among leading companies, is 6.1 per cent. The individual company data and averages are shown in the table below.

Shares of transmission and/or distribution companies give a slightly higher yield on the average, approximating 5.7 per cent, with the most liberal at present market quotations aggregating 6.8 per cent.

These two yields compare with the 5.58 per cent and 5.72 per cent, respectively, which can be realized by purchasing shares of the class A and B electric utility company common stocks used for comparative purposes in the AMERICAN GAS JOURNAL index of utility common stock yields, shown on page 23.

Strange as it may seem, some of the lowest yields on pipe line transmission stocks are those offered by shares of companies which have the greatest proportion of debt to capitalization of all the companies in this group. The same holds true, but in somewhat more limited manner, for companies in the transmission and distribution phase of the business.

Debt, Earnings and Dividend Ratios of Key Natural Gas Companies

	% debt to Total Capitalization	% of Revenues Brought Down to Net	Per Share Earnings on Common Stock	12 Months Ended (1949)	Annual Dividend Rate	% of Earnings Paid out as Dividends	Yield %	Book Value	Market Price (Sept. 21, 1949)	Market Price Times Earnings
Natural Gas Transmission Companies:										
El Paso Natural Gas Co.	82.0	22.8	$2.21	(7/31)	$1.20		4.7	$10.64	25⅝	11.5
Texas Eastern Transmission Corp.	80.4	16.8	1.42	(6/30)	——		—	8.14	16¼	11.4
Texas Gas Transmission Corp.	77.4	15.2	.75	(5/31)	——		—	7.94	13⅞	18.5
Tennessee Gas Transmission Co.	72.5	20.8	2.24	(7/31)	1.40		4.7	12.27	29¾	13.3
Panhandle Eastern Pipe Line Co.	67.6	22.3	4.66	(6/30)	3.00		5.3	26.21	56¾	12.2
Southern Natural Gas Co.	61.1	16.6	3.08	(6/30)	2.00		6.1	21.52	32¾	10.6
Mississippi River Fuel Corp.	51.7	17.7	2.57	(6/30)	1.80		5.5	18.99	33	12.9
Consolidated Gas Utilities Co.	46.2	22.3	1.72	(7/31)	.60		4.8	9.99	12⅝	7.3
United Gas Corp.	45.4	19.7	1.44	(6/30)	1.00		5.6	12.88	17⅞	12.4
Northern Natural Gas Co.	45.3	23.6	2.65	(6/30)	1.80		5.2	20.30	34½	13.0
Average	63.0%	19.8%	$2.27		$1.28	56%	4.2%			12.3
Natural Gas Transmission and/or Distribution Companies:										
American Natural Gas Co.	65.9	4.1	$1.52	(6/30)	$1.20		4.4	$26.77	27¼	17.9
Southwest Natural Gas Co.	64.4	11.5	.34	(6/30)	.20		5.7	1.34	3½	10.3
Minneapolis Gas Co.	60.6	10.5	.69	(6/30)	.80		5.8	4.10	13¾	20.1
Houston Natural Gas Co.	53.6	10.4	1.42	(7/31/48)	.80		5.6	8.40	14⅜	10.1
Southern Union Gas Co.	51.1	16.3	1.53	(6/30)	.80		4.9	2.65	16½	10.7
Pacific Lighting Corp.	50.8	8.0	3.59	(6/30)	3.00		5.8	36.96	52⅛	14.5
Columbia Gas System	48.7	11.7	.90	(6/30)	.75		6.6	12.46	11½	12.6
Oklahoma Natural Gas Co.	48.1	19.7	3.17	(7/31)	2.00		6.8	21.20	29¾	9.3
Rio Grande Valley Gas Co.	43.1	20.0	.20	(12/31/48)	.12		6.4	1.86	1⅞	9.4
Lone Star Gas Corp.	41.3	25.1	1.97	(6/30)	1.20		5.4	12.94	22	11.2
Average	52.8%	13.7%	$1.53		$1.09	71%	5.7%			12.6

Rock and Swamp Fail to Stop New Pipe Line

by R. E. Grant

Superintendent of Transmission, Pittsburgh Group Companies, Columbia Gas System.

BOTTOMLESS swamps and rocky terrain combined to present Home Gas Company with some difficult problems during the last dozen or so months when construction was at its peak on a major high pressure pipe line replacement project.

The location of this new 1,000 lb. pipe line is in the southern counties of New York State. The general project is one of about 100 miles, extending from Hancock, N. Y., on the Delaware River which is the New York-Pennsylvania boundary, to Nyack, N. Y., on the Hudson River.

Back in 1870-1890, when oil transportation was as vital a topic as natural gas transportation is today, four six in. oil lines were laid from the Hudson River area up towards Binghamton and then along the southern tier counties to the general area of Olean, N. Y.

For a good number of years these lines have been used to transport natural gas. However, their capacity limits its gas volume and their age and condition limits the higher pressures required. Therefore, these four old lines are gradually being paralleled or replaced by 12 in., 10 in. and eight in. high pressure lines.

During 1948 some 30 miles of 12 in. line were laid from Hancock in a general south-easterly direction to Cochecton, also on the Delaware River. This year's project is to continue the replacement with 12 in. line down to Port Jervis—near the junction of New York-New Jersey and Pennsylvania—and then lay 28 miles of 10 in. and 20 miles of eight in. to West Nyack, N. Y.

Part of this new construction is on an entirely new right-of-way, as the old oil lines passed through New Jersey for

(Continued on page 62)

These illustrations show some of the difficult construction encountered. The two pictures at the top are of the entrance to one of the swamps, with the corduroy road. Equipment is pipe-laying tractor and two electric welding machines. The third picture shows the ditch opened through the swamp, with pipe strung on the corduroy road. The bottom illustration shows a caterpillar tractor which upset in the swamp when trees forming the corduroy road broke. The crawler track is visible back of the man on the left, but the rest of the tractor is submerged. It was pulled out, however.

All of these illustrations, which appear here by courtesy of *News and Views*, were taken after a prolonged dry spell.

Estimating Potential Gasification Value and Yields of Oils for Gas Plants

by E. S. Pettyjohn and H. R. Linden

THE carburetted water gas or oil gas producer has always used the lowest cost petroleum fraction or residue for gas making purposes. In the inception of the carburetted water gas process, gasoline and light naphthas were used for carburetion. With the growth of the automotive industry these light fractions were more valuable as motor fuel and were replaced with gas oil, a straight run, mid-boiling petroleum fraction. These early enriching materials were largely paraffinic in character and could be selected on gravity or gravity and key fraction boiling point specifications. *(1)*

The development of thermal cracking and the discovery and exploitation of the mid-continent and gulf coastal oil fields combined with the rapid expansion in automotive transport during the nineteen-twenties completely changed the character of materials used for carburetion. Thermally cracked residues from naphthene and mixed base crudes became the lowest cost enriching materials and new tests attempting to differentiate between paraffins, olefins, naphthenes and aromatics were devised. *(2, 3)* These tests were only partially successful as they were either time-consuming, or insensitive, or both. The laboratory cracking tube test, of greater reliability and reproducibility, became the accepted test method. *(4, 5)*

Mr. Pettyjohn is director of the Institute of Gas Technology, Chicago, and Mr. Linden is supervisor of the oil research laboratory at the Institute.

This is Part 1 of a paper developed in connection with the investigation on "The Enriching Value of Oils for Carburetion," sponsored by the Gas Production Research Committee of the American Gas Association, a PAR activity. Part 2 will appear in the November issue of AMERICAN GAS JOURNAL.

The numbers 1 to 40 in the text refer to a bibliography which appears on page 57 of this issue.

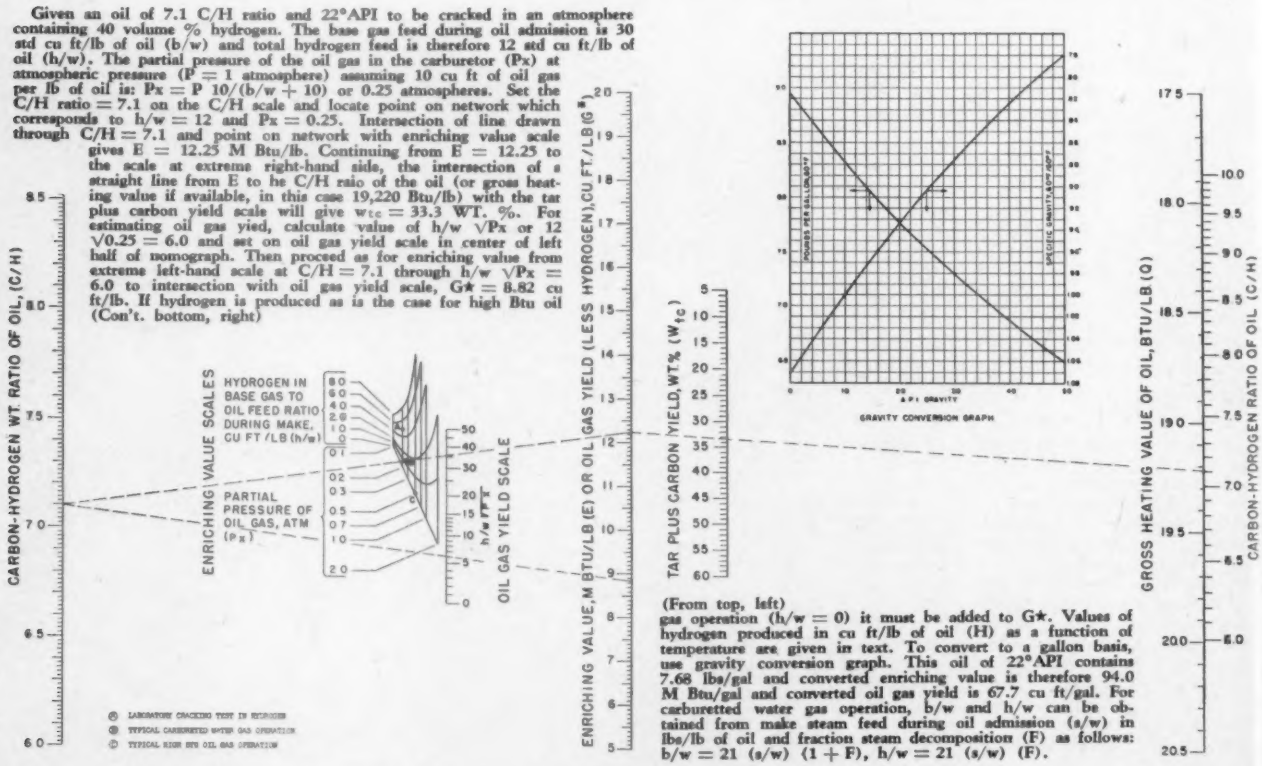

Given an oil of 7.1 C/H ratio and 22°API to be cracked in an atmosphere containing 40 volume % hydrogen. The base gas feed during oil admission is 30 std cu ft/lb of oil (b/w) and total hydrogen feed is therefore 12 std cu ft/lb of oil (h/w). The partial pressure of the oil gas in the carburetor (Px) at atmospheric pressure (P = 1 atmosphere) assuming 10 cu ft of oil gas per lb of oil is: Px = P 10/(b/w + 10) or 0.25 atmospheres. Set the C/H ratio = 7.1 on the C/H scale and locate point on network which corresponds to h/w = 12 and Px = 0.25. Intersection of line drawn through C/H = 7.1 and point on network with enriching value scale gives E = 12.25 M Btu/lb. Continuing from E = 12.25 to the scale at extreme right-hand side, the intersection of a straight line from E to he C/H raio of the oil (or gross heating value if available, in this case 19,220 Btu/lb) with the tar plus carbon yield scale will give wtc = 33.3 WT. %. For estimating oil gas yied, calculate value of h/w √Px or 12 √0.25 = 6.0 and set on oil gas yield scale in center of left half of nomograph. Then proceed as for enriching value from extreme left-hand scale at C/H = 7.1 through h/w √Px = 6.0 to intersection with oil gas yield scale, G★ = 8.82 cu ft/lb. If hydrogen is produced as is the case for high Btu oil (Con't. bottom, right)
CARBON-HYDROGEN WT. RATIO OF OIL, (C/H)
ENRICHING VALUE SCALES
HYDROGEN IN BASE GAS TO OIL FEED RATIO DURING MAKE, CU FT /LB (h/w)
PARTIAL PRESSURE OF OIL GAS, ATM (Px)
OIL GAS YIELD SCALE
ENRICHING VALUE, M BTU/LB (E) OR OIL GAS YIELD (LESS HYDROGEN), CU FT/LB (G★)
TAR PLUS CARBON YIELD, WT.% (Wtc)
GRAVITY CONVERSION GRAPH
GROSS HEATING VALUE OF OIL, BTU/LB (Q)
CARBON-HYDROGEN RATIO OF OIL (C/H)
(From top, left)
gas operation (h/w = 0) it must be added to G★. Values of hydrogen produced in cu ft/lb of oil (H) as a function of temperature are given in text. To convert to a gallon basis, use gravity conversion graph. This oil of 22°API contains 7.68 lbs/gal and converted enriching value is therefore 94.0 M Btu/gal and converted oil gas yield is 67.7 cu ft/gal. For carburetted water gas operation, b/w and h/w can be obtained from make steam feed during oil admission (s/w) in lbs/lb of oil and fraction steam decomposition (F) as follows: b/w = 21 (s/w) (1 + F), h/w = 21 (s/w) (F).

Fig. 1—Nomograph for Estimating Oil Gasification Data.

During World War II, catalytic cracking expanded rapidly and, combined with thermal cracking, materially reduced the supply of straight-run oils. The quantity of premium straight-run oils has been further reduced by vacuum distillation of topped crudes resulting in lower API gravity and higher Conradson carbon content residuums. Charging stocks were and are largely from mid-continent and gulf coastal crudes and as such are largely naphthenic in character.

The distillates, residues and blended oils from the catalytic cracking processes are highly aromatic and thermally stable and are not good enrichers for water gas or make oils for oil gas manufacture. The vacuum residuums are also of limited gasification value. Modifications of the various methods of estimating enriching values from simple physical and chemical tests developed to apply to the entire range of carburetting oils were usually based on an entirely empirical approach. *(6, 7, 8)* Limited acceptance of these methods was responsible for the continued use of the cracking tube test for selection of gas making oils.

Fortunately for the gas maker, only a few of many hydrocarbons appear as stable gases in his product. Regardless of the character of the oils used, the finished oil gas will consist largely of methane, ethane, ethylene, propylene and varying quantities of hydrogen depending on the composition of the cracking atmosphere and the depth of cracking and smaller amounts of benzene, toluene and higher aromatics.

Cracking Conditions Severe

The cracking conditions employed in the carburetted water gas or oil gas set are much more severe than those in the thermal or catalytic cracker and, therefore, naphthene and possibly aromatic rings are shattered along with the breakdown of straight and branched chain paraffins and olefins. The free radicals obtained can only remain in the gas as one of the hydrocarbons listed above for the range of contact times used in the gas industry. These hydrocarbons (methane, ethane, ethylene and propylene) have low carbon to hydrogen weight ratios and, with hydrogen if any is produced from the oil, largely constitute the finished oil gas. The higher C/H ratio hydrocarbons (aromatics) beginning with benzene and toluene are seldom present in the gas phase in significant quantities and appear as condensables and in the tar.

This separation of the resultant hydrocarbons into low molecular weight, low C/H ratio, stable, gaseous hydrocarbons and into high molecular weight, high C/H ratio, liquid hydrocarbons

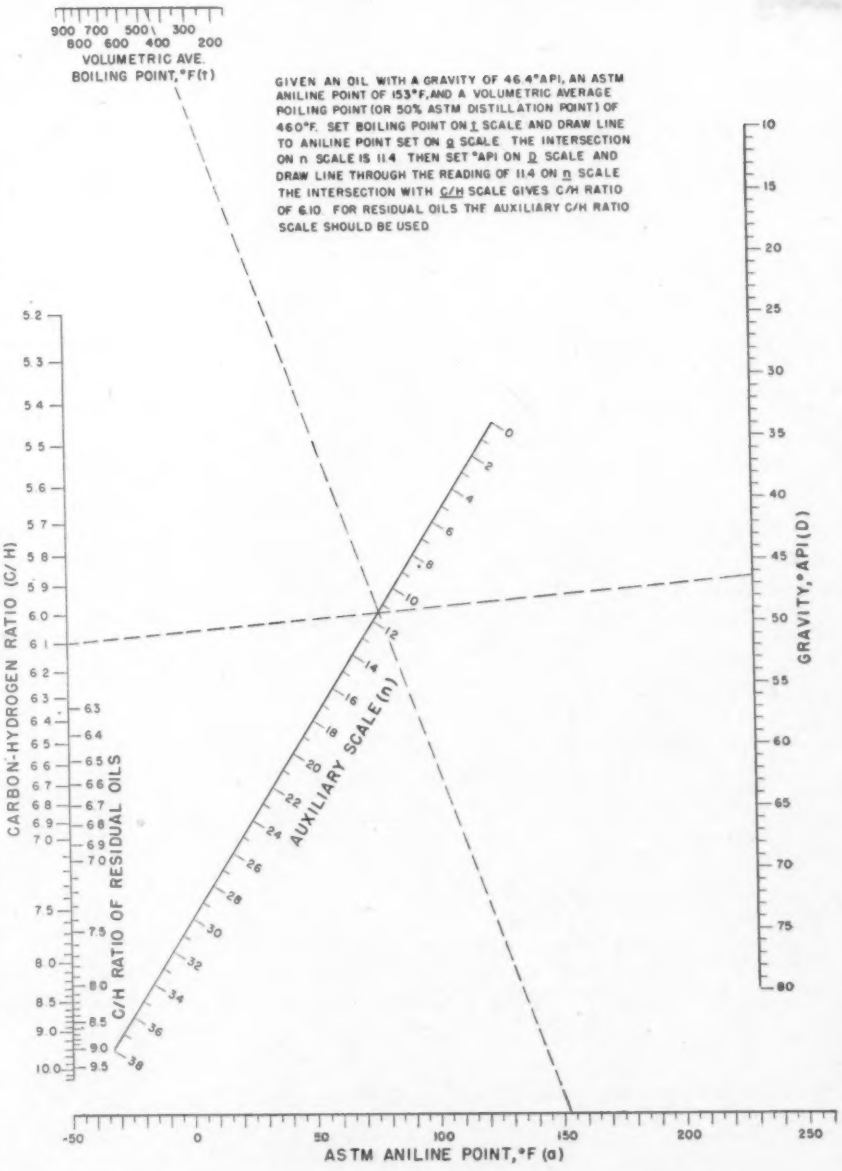

900 700 500 300
800 600 400 200
VOLUMETRIC AVE. BOILING POINT, °F (t)
GIVEN AN OIL WITH A GRAVITY OF 46.4°API, AN ASTM ANILINE POINT OF 153°F, AND A VOLUMETRIC AVERAGE BOILING POINT (OR 50% ASTM DISTILLATION POINT) OF 460°F. SET BOILING POINT ON t SCALE AND DRAW LINE TO ANILINE POINT SET ON a SCALE. THE INTERSECTION ON n SCALE IS 11.4. THEN SET °API ON D SCALE AND DRAW LINE THROUGH THE READING OF 11.4 ON n SCALE. THE INTERSECTION WITH C/H SCALE GIVES C/H RATIO OF 6.10. FOR RESIDUAL OILS THE AUXILIARY C/H RATIO SCALE SHOULD BE USED.
CARBON-HYDROGEN RATIO (C/H)
C/H RATIO OF RESIDUAL OILS
AUXILIARY SCALE (n)
GRAVITY, °API (D)
ASTM ANILINE POINT, °F (a)

Fig. 2—Nomograph for Determination of C/H Ratios of Liquid Hydrocarbons with Correction for Residual Petroleum Fractions.

is the measure of the gasification value of the petroleum fraction used. Due to the severity of the cracking conditions the distribution between gas and tar is largely dependent upon the initial C/H ratio of the oil used, the concentration of hydrogen in the cracking atmosphere and the partial pressure of the oil gas. A correlation of enriching value with C/H ratio appeared to offer the simplest and best method for selecting oils for carburetion or oil gas production, provided simple, reproducible methods could be developed to obtain the C/H ratio, and provided reliable laboratory cracking tube test and plant operating data could be made available to establish the correlation. Similar conclusions had been drawn by previous investigators, notably Merkus and White. *(9)*

During the past year this correlation has been developed in the oil evaluation laboratory at the Institute of Gas Technology as part of the study of "The Enriching Value of Oils for Carburetion" sponsored by the Gas Production Research Committee of the American Gas Association, a PAR plan activity, and the equations obtained substantiated with additional data from outside laboratories and plant data. Simplification of methods for obtaining the C/H weight ratio for oils was then studied. An improved version of the standard ultimate analysis test was demonstrated to be a simple, effective laboratory procedure

REFERENCE	TYPE OF PROCESS	MAKE OIL DATA: Type	°API	Distillation °F 10%	50%	90%	Viscosity 100°F	122°F	Aniline Point °F	Est. C/H Ratio	OPERATING CONDITIONS: Cracking Temp., °F Carburetor or Oil Gas Generator	Superheater	Gals. Make Oil/MCF	Steam Dur. Oil Adm. Lbs./Gal. Make Oil	Wg in Carrier Gas(b/w) SCF/Lb. Make Oil	Partial Pressure Oil Gas (Px Atm.)
Lee, J.E.[22]	430 Btu Carb. Water Gas:	Gas Oil	34.9	511	570	660	3.9 CP	2.5 CP	160	6.54	1925-1215	1400-1575	1.82	7.83	41.8	18.5	0.193
	"	"	"	"	"	"	"	"	"	"	1850-1650	1400-1700	2.06	5.70	30.5	13.5	0.247
Culver, G.W.[23]	Carb. Water Gas:	Heavy Oil	17.6	545	825	--		191.6SSU		7.53	--	1500	3.86	4.25	20.2	9.0	0.331
Horn, R.J.[24]	Carb. Water Gas, 20% of Oil in Generator:	Gasoline	63.7					28.6SSU		5.5	--	1213-1450	2.88	4.70	29.5	13.1	0.253
		67.4% Gas Oil, 32.6% Crude	35.7					44 SSU		6.33	--	1105-1470	3.20	4.48	24.0	10.7	0.294
Richards, J.V.[25]	Carb. Water Gas, 53% of Oil in Gen.: Cracking Tube Blue Gas Atm.:	Bunker B	18.7				780 SSU			7.33		1348	3.48	--	--	12[a]	0.25[a]
		"	"				"			"	1550	--	3.00	--	37.6	19.8	0.238
Willien, L.J.[18]	Cracking Tube Hydrogen Atm.:	Residuum	17.8					64 SSF		7.35	1500	--	2.44	--	45.9	45.9	0.208
		"	"					"		"	1600	--	2.45	--	46.0	46.0	0.218
Dent, F.J.[19]	Cracking Tube Hydrogen Atm.: Blue Gas Atm.:	Gas Oil	33.6							6.81***	1562		4.33	--	25.8	25.8	0.374
		"	"							"	1472	--	3.88	--	28.2	14.1	0.300
Utermohle, C.E.[26]	High Btu Oil Gas, Hall Process:	AGA No. 3[g]	30.2	480	575	682	5.31CSKS		146.5	6.86***	1461-1689	1080-1663	11.50[m]	0.49	1.4	0	0.87
		AGA No. 2[g]	19.0	552	801	--		157.5SSU	151.0	7.35***	1440-1627	1038-1574	11.46[m]	0.71	1.9	0	0.84
		AGA No. 1[g]	22.2	545	903	--		193.2SSU	179.7	7.05***	1433-1569	1043-1602	10.67[m]	1.04	2.9	0	0.78
		AGA No. 4[g]	14.2	650	985	--		163.8SSF		7.73***	1441-1563	1024-1588	11.69[m]	1.47	3.8	0	0.72
		AGA No. 5[g]	12.0	688	972	--		153.4SSF		8.03***	1549-1653	1034-1595	13.31[m]	1.58	4.1	0	0.71
Utermohle, C.E.[27]	High Btu Oil Gas, Twin Gen. Process:	AGA No. 3[g]	30.2	480	575	682	5.31CSKS		146.5	6.86***	1715-1766	1526-1570	11.42[m]	2[o]	6	0	0.6
		AGA No. 2[g]	19.0	552	801			157.5SSU	151.0	7.35***	1312-1552	1567-1652	12.70[m]	2[o]	6	0	0.6
		AGA No. 1[g]	22.2	545	903			193.2SSU	179.7	7.05***	1499-1570	1542-1574	12.39[m]	2[o]	6	0	0.6
Lamb, F.P.[28]	High Btu Oil Gas, Single Gen. Process:	Gas Oil	35.2	451	517	612	36 SSU			6.62	1560-1380	1500-1350	12.52	2.03	6.1	0	0.62
Paganelli, S.[29]	High Btu Oil Gas, Single Gen. Process:	Gas Oil[g]	35.7	299	552	646			144.3	8.64	1320-1700	1530-1455	11.05	1.67	5.0	0	0.67
Fraser, W.R.[30]	High Btu Oil Gas, Twin Gen. Process:	Gas Oil[g]	36.2	503	584	677	42.2SSU		170	6.38	1630-1650	1595-1545	9.43	1.78	5.3	0	0.65
Richardson, H.E.[31]	High Btu Oil Gas, Twin Gen. Process:	Louisiana Crude[g]	25.4	550	795	--		79.1SSU		6.86	1510	1470	11.56	0.44	1.3	0	0.89
Henry, H.M.[32]	High Btu Oil Gas, Twin Gen. Process:	No. 2 Fuel Oil	33.3	--	490	603	38 SSU			6.79	--	--	11.93	1.1	3.2	0	0.76
		Special No. 2 Fuel Oil	37.2				34.9SSU			6.47	--	--	10.26	0.6	1.7	0	0.85
Henry, H.M.[33]	High Btu Oil Gas, Twin Gen. Process:	Offshore Crude	25.1				114.8SSU			6.88	--	--	11.43	1[a]	2	0	0.8
Harritt, J.A., Wills, F. and Willien, L.J.[34]		Jones Oil Gas Generator: Diesel Oil	31.2	466	550	675				6.85	--	1400	11.78	2[o]	6	0	0.6
White, C.E.[36]	Cracking Tube No Diluent:	Fuel Oil	25.4	428	656	752	60.0SSU			7.17	1523	--	13.71	0	0	0	1.0
		Stove Oil	37.8	365	453	532	34.8SSU			6.56	1544	--	12.72	0	0	0	1.0
Wheeler, R.V. and Wood, W.L.[21]	Cracking Tube No Diluent:	Propane								4.47	1562	--	13.10	0	0	0	1.00
		Butane								4.77	1562	--	12.38	0	0	0	1.00
Eastwood, S.C. and Potas, A.E.[35]	Thermofor Pyrolytic Cracking Pilot Plant:	Mirando Crude	21.2	448	620	915			131	7.70	1500	--	17.26	3.8[o]	11	0	0.5

Table 1—Comparison of Actual and Estimated Oil Gasification Results.

and is the preferred method. A rapid combustion bomb type substitute procedure has also been studied but still requires further development. *(9)*

The alternative to laboratory determinations of carbon and hydrogen was in the estimation of the C/H ratio by using combinations of two or three simple physical properties of petroleum fractions or residues. Three direct methods for estimating C/H ratios from various groups of simple physical tests were developed, *(10)* and nomographs prepared which permitted an estimate of C/H ratios within 0.10 C/H ratio average deviation. (See Figs. 2, 3, 4.)

In anticipating oil gasification results using the C/H ratio, either estimated from one of the groups of physical properties or determined by ultimate analysis, operating data indicating the partial pressure of hydrogen in the base gas and the partial pressure of oil gas in the cracking zone are also required. The investigation discussed here was primarily concerned with the correlation of these variables and the practical application of the correlations.

Experimental

A 2.47 inch inside diameter externally heated cracking tube with a concentrically placed 1.05 inch outside diameter thermowell was used in this investigation. The free volume of the heated section was 0.115 cu. ft. and four independently controlled electrical heating elements were used. Oil was introduced through a low-pressure gas atomizing nozzle. The base gas was generally used for atomization. When no base gas was used, the oils were preheated under pressure in a recirculating pumping system and flashed through the nozzle to the lower tube pressure. Base gases included hydrogen, carbon-monoxide, steam and nitrogen and mixtures thereof. Only hydrogen was found to be active with the other constituents acting simply as diluents.

Before making a run the heating value and specific gravity of the feed gases were determined. The unit was then brought to steady-state operation. The actual period of data taking and sample collection varied from one to six hours depending on the rate of carbon formation in the tube. Material balances and percentages of heats of combustion of feed oil and feed gases recovered in the products were based on averaged recorded gas heating values and specific gravities plus other required data and varied generally between 94 and 102 per cent. All other calculated data were based on stabilized make gas which was obtained by permitting the holder sample to remain at room temperature for 16 hours.

In the early runs all gases were analyzed with a Goeckel apparatus according to Universal Oil Products Co. Method No. G-84-40. *(11)* In the later runs the analyses were made with an improved Orsat apparatus developed by the Institute staff. This new apparatus uses a Shepard compensating burette and multiple combustions. The heating values obtained by calculation from the gas analyses were lower

OPERATING RESULTS											
Make Gas Data									Deviations		
B. T. U. Btu/Cu.Ft.	% H₂	% Paraff.	% Olef.	% Oil Gas*	Cu. Ft. of Oil Gas per Gal. Oil*	Btu Recov. per Gal. of Oil	Btu Recov. per Gal. of Oil	Cu. Ft. of Oil Gas per Gal. Oil*	Btu Recov. M Btu/ Gal.	Gaseous Hydroc. Yield SCF/Gal.
434	41.6	9.2	5.8	15.0	82.5	114,000**	102,600	74.8	-11.4	-7.7
420	38.4	7.4	6.0	13.4	65.0	101,500**	100,000	73.0	- 1.5	+8.0
538.7	29.1	10.8	8.9	19.7	51.0	90,700**	83,400	60.4	- 7.3	+9.4
555	32.8	12.4	10.0	22.4	77.8	112,500	106,000	77.2	- 6.5	-0.6
553	35.5	12.3	10.3	22.6	70.7	103,100	102,000	75.0	- 1.1	+4.3
530	32.2	13.5	8.2	21.7	62.4	92,800**	90,400	65.2	- 2.4	+2.8
518	36.4	14.0****	7.7	21.7	72.4	99,700	92,800	70.3	- 6.9	-2.1
529	78.6	14.0	6.8	20.8	85.2	100,600	99,000	82.6	- 1.6	-2.6
530	76.6	15.7	6.1	21.8	89.0	100,600	99,000	82.6	- 1.6	-6.4
--	--	27.2	10.2	37.4	86.1	101,600	96,500	79.1	- 5.1	-7.0
--	--	18.7	11.3	30.0	77.3	100,900	93,900	70.2	- 7.0	-7.1
1046	16.1	35.2	26.2	77.5(61.4)	64.5(51.0)	87,000	79,300	--(57.1)	- 7.7	+6.1
1006	20.0	32.6	22.4	75.0(55.0)	65.1(47.7)	87,300	75,500	--(52.1)	-11.8	+4.4
1047	19.4	34.7	23.4	77.5(58.1)	69.4(52.1)	93,700	81,300	--(56.5)	-12.4	+4.4
966	17.1	31.6	23.6	72.3(55.2)	64.0(48.8)	85,500	70,200	--(46.6)	-15.3	-2.2
974	21.3	28.6	24.3	74.2(52.9)	57.1(40.8)	75,100	64,100	--(41.5)	-11.0	+0.7
1088	17.2	39.7	27.1	84.0(66.8)	67.6(53.7)	87,600	84,000	--(57.1)	- 3.6	+3.4
900	19.0	31.6	21.0	71.6(52.6)	62.6(46.0)	78,700	79,700	--(52.1)	+ 1.0	+6.1
970	13.4	33.3	25.9	72.6(59.2)	60.5(49.2)	80,800	83,700	--(56.5)	+ 2.9	+7.3
1046	16.1	42.3	28.9	87.3(71.2)	69.7(56.9)	83,600	86,400	--(59.4)	+ 2.8	+2.5
911	11.2	32.8	24.5	68.5(57.3)	62.0(51.9)	82,500	84,700	--(58.8)	+ 2.2	+6.9
917	20.4	29.5	25.8	75.7(55.3)	80.3(58.7)	97,200	89,900	--(62.9)	- 7.3	+4.2
975	16.9	43.2	22.8	82.9(66.0)	71.7(57.1)	84,300	82,200	--(58.9)	- 2.1	+1.8
972	21	36	26	83(62)	70(52)	81,500	81,200	--(57.0)	- 0.3	+5.0
966	14	35	23	72(58)	70(57)	94,200	84,600	--(61.1)	- 9.6	+4.1
993					--	86,900	82,900	--	- 4.0	--
975	21.7	48.0	20.7	90.4(68.7)	76.8(58.3)	82,580	83,000	--(56.8)	+ 0.4	-1.5
1008	24.7	54.7	19.6	99.0(74.3)	72.2(54.2)	73,500	74,300	75.8(53.3)	+ 0.8	-0.9
1031	23.4	54.5	21.2	99.1(75.7)	78.0(59.5)	81,100	81,000	82.8(59.5)	- 0.1	0.0
1000	26.6	54.1	19.3	100.0(73.4)	75.1(55.1)	76,400	74,300	72.6(57.4)	- 2.1	+2.3
983	25.2	56.8	18.0	100.0(74.8)	79.6(59.6)	79,400	81,300	80.1(62.6)	+ 1.9	+3.0
1282	17.8	47.1	35.1	100.0(82.2)	57.9(47.6)	74,200	70,500	--(44.7)	- 3.7	-2.9

Table 1 (continued)

found to apply within the limits of maximum experimental error to laboratory data between 0.7 and 5* seconds residence time and cracking temperatures between 1400 and 1700°F (except for runs at high temperatures and long residence times for low C/H ratio oils and runs at low temperatures and short residence times for high C/H ratio oils) although originally based on constant operating conditions of 2.5 seconds and 1550°F.

This apparent insensitivity of enriching values (Btu recoveries) and oil gas yields (excluding hydrogen if there is any net hydrogen production) towards temperature and residence time variations within reasonable lim-

Abstract by the Authors

Correlations of the enriching value (Btu recovery in the finished make gas) and the gaseous hydrocarbon and tar plus carbon yields with the carbon-hydrogen ratio of oils, the partial pressure of the oil gas in the cracking zone and the relative quantities of base gas hydrogen and oil introduced into the cracking zone are presented.

Originally developed from laboratory cracking tests for a cracking temperature of 1550°F and 2.5 seconds residence time, these correlations are also applicable with considerable accuracy over the temperature and residence time ranges used in the manufacture of carburetted water gas and high Btu oil gas.

Methods for estimating the C/H ratio from various groups of physical tests are reviewed.

Approximation of the other required operating variables from steam data for carburetted water gas and high Btu oil gas manufacture are discussed.

Comparisons between actual and estimated cracking results are given. Applicability to pilot plant and laboratory cracking tube data for a range of feed stocks from propane to Bunker C fuel oil is demonstrated.

than the observed values from the recording calorimeter, a discrepancy credited to the failure to detect benzene and toluene at normal concentrations of 0.5 per cent by volume. The extent of this error was determined through a mass spectrometer analysis of a typical make gas.

Oils and tars were analyzed by standard ASTM methods *(12)* with some minor modifications for application to residual oils. *(13)* Ultimate analyses of oils were determined on a macro scale by an adaptation of ASTM method D 271-44 according to the Millin technique. *(14)* In this investigation the tar recovered by the experimental procedure employed contained the larger portion of the light oils, including benzene and toluene. The recovery of the light aromatics was increased when a water-cooled naphthalene trap was installed. With the increased removal of light aromatics in the tar, the holder Btu loss during stabilization of the make-gas decreased to 5-10 Btu/cu. ft.

**Residence times up to 14 seconds were used at temperatures of 1550°F and less causing no appreciable deviations.*

Correlation of Cracking Data

In the study reported here an attempt was made to go beyond the development of a method for estimating enriching values alone, based on laboratory cracking data at only one or a limited number of operating conditions. In addition to the enriching value or its equivalent in oil gas production, the oil gas yield and composition and the tar yield were also considered. Further, the effect of the variables of base gas hydrogen concentration in the cracking atmosphere and of base gas to oil feed ratio (expressed in terms of partial pressures of base gas hydrogen and oil gas) were evaluated since some of the lack of agreement between laboratory tests and plant results observed in the past, particularly in the case of high Btu oil gas production, was believed to be partially due to failure to take these variables into account.

The correlations presented here were

its is further demonstrated by the good agreement between plant and pilot plant cracking results for all types of oil gasification processes and estimated cracking results (See Table I.)

From exploratory runs and a study of the literature *(9, 15, 16, 17, 18, 19)* it appeared that:

(1) The enriching values, oil gas and residue yields per pound of oil obtained from liquid petroleum products may be

expressed as simple functions of the carbon-hydrogen weight ratio of the oils at constant cracking conditions.

(2) Cracking conditions can be defined by the following variables for a given oil gasification unit:
   (a) Cracking temperature
   (b) Residence time
   (c) Partial pressure of base (carrier) gas hydrogen
   (d) Partial pressure of oil gas

To facilitate plant application, the partial pressure** of base gas hydrogen was expressed as a function of the product of the partial pressure of oil gas (Px) in atmospheres and the base gas hydrogen to oil feed ratio (h/w) in std. cu. ft./lb. These two variables can be estimated from steam data for carburetted water gas and high Btu oil gas operation (h/w is zero in high Btu oil gas operation) as discussed in Part II.

Using results of 105 cracking tests of 17 oils ranging from natural gasoline to Bunker C fuel oil (C/H ratios from 5.2 to 8.03) in atmospheres containing varying amounts of hydrogen, steam, carbon monoxide and nitrogen, it was possible to correlate most of the gasification data with the operating variables listed above in the form of relatively simple equations since only hydrogen was found to be an active component for the conditions employed. The other base gas components, including steam and unreacted hydrogen, acted as diluents with an effect comparable to that produced by an equivalent decrease in total pressure. Runs at total pressures (P) up to four atmospheres and hydrogen to oil feed ratios (h/w) from 0 to 90 std. cu. ft./lb. were included in the basic data to support the validity of these correlations beyond the range of present plant operating conditions. The partial pressures of oil gas (Px) varied from 0.1 to four atmospheres (x is the volume or mol per cent of oil gas leaving the cracking zone). When applying these correlations to literature data ranging from pyrolysis data of gaseous paraffins and olefins *(20, 21)* to carburetted water gas *(22, 23, 24, 25)* and high Btu oil gas data *(26, 27, 28, 29, 30, 31, 32, 33, 34)* good agreement was usually obtained.

The enriching value, or its equivalent in oil gas operation, (E) in Btu/lb. of oil was expressed as:

$$E = [0.830 - 0.228 \log Px]\ [36{,}400 + 145\ Px\ (h/w) - 3410\ C/H] \quad \text{(Equ. 1.)}$$

The arithmetic average deviation of this equation is 340 Btu/lb. or approximately three per cent and the maximum deviation is six per cent. The effects of cracking temperature and residence time were responsible for only a minor part of these deviations as noted above. Elimination of the data at temperatures and residence times other than 1550°F and 2.5 seconds would not reduce the average and maximum deviations materially.

Equation 1

Equation 1 was derived by standard graphical methods of data analysis. Its general form could be predicted from available data on high-temperature, vapor-phase cracking for the production of fuel gases, ethylene and other olefins, and pyrolysis benzols and other liquid aromatics. From this work it was known that:

(1) Increasing C/H ratios (decreasing hydrogen contents) of oils would reduce gasification yields and thereby enriching values or Btu recoveries. *(9)*

(2) Increasing partial pressures of hydrogen in the base (carrier) gas (a function of Px times h/w) would either cause depression of hydrogen liberation from the oil or result in increasing quantities of hydrogen absorption *(15)* thereby increasing gasification yields and enriching values.

(3) Increasing total pressure (P) or oil gas concentration (x) in the cracking zone would

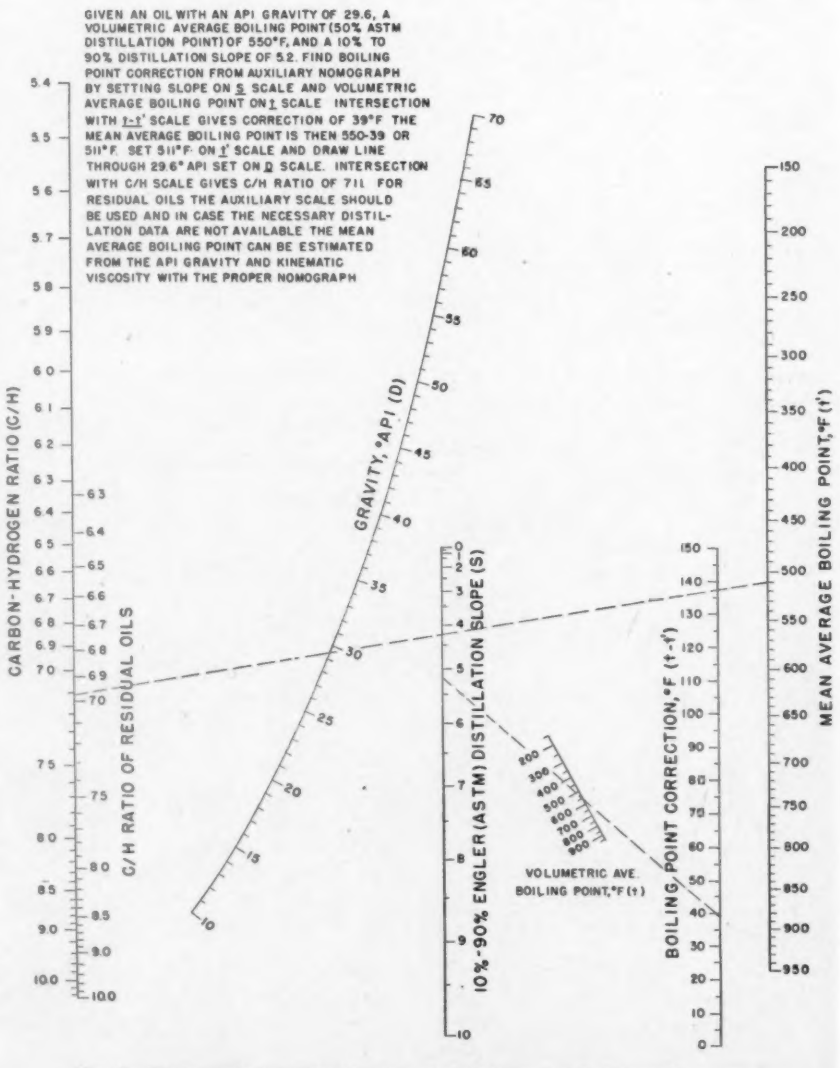

GIVEN AN OIL WITH AN API GRAVITY OF 29.6, A VOLUMETRIC AVERAGE BOILING POINT (50% ASTM DISTILLATION POINT) OF 550°F, AND A 10% TO 90% DISTILLATION SLOPE OF 5.2. FIND BOILING POINT CORRECTION FROM AUXILIARY NOMOGRAPH BY SETTING SLOPE ON S SCALE AND VOLUMETRIC AVERAGE BOILING POINT ON t SCALE. INTERSECTION WITH t-t' SCALE GIVES CORRECTION OF 39°F. THE MEAN AVERAGE BOILING POINT IS THEN 550-39 OR 511°F. SET 511°F. ON t' SCALE AND DRAW LINE THROUGH 29.6° API SET ON D SCALE. INTERSECTION WITH C/H SCALE GIVES C/H RATIO OF 7.11. FOR RESIDUAL OILS THE AUXILIARY SCALE SHOULD BE USED AND IN CASE THE NECESSARY DISTILLATION DATA ARE NOT AVAILABLE THE MEAN AVERAGE BOILING POINT CAN BE ESTIMATED FROM THE API GRAVITY AND KINEMATIC VISCOSITY WITH THE PROPER NOMOGRAPH
CARBON-HYDROGEN RATIO (C/H)
C/H RATIO OF RESIDUAL OILS
GRAVITY, °API (D)
10%-90% ENGLER (ASTM) DISTILLATION SLOPE (S)
VOLUMETRIC AVE. BOILING POINT, °F (t)
BOILING POINT CORRECTION, °F (t-t')
MEAN AVERAGE BOILING POINT, °F (t')

Fig. 3—Nomograph for Determination of C/H Ratios of Petroleum Fractions.

***The partial pressure of a component of a gas mixture is the product of the absolute (total) pressure and the volume or mol fraction of the component if the ideal gas laws are assumed.*

depress gasification and increase polymerization of intermediate cracking products *(17, 18)* thereby producing more liquid and solid products and decreasing enriching values or Btu recoveries.

It can be seen that the results of this investigation as expressed in Equation 1 agree with the results of the previous investigators. It should be noted that the composition of the gaseous products is also affected by the variables discussed above. An increase in partial pressure of oil gas or of hydrogen will increase the ratio of paraffins to olefins (illuminants). However, the effects of cracking temperature and residence time on gas composition (both producing an increase in the paraffin-olefin ratio) are of such magnitude as to make methods for estimating gas compositions for industrial operation impractical due to the uncertainty in temperature and residence time measurements and the lack of uniform conditions.

The correlation between the gaseous hydrocarbon yield (G*) in std. cu. ft./lb. of oil and the C/H weight ratio of the oil, the hydrogen to oil feed ratio (h/w) in std. cu. ft./lb. and the partial pressure of the oil gas (Px) in atmospheres in the cracking zone was developed by the same empirical methods used for the enriching value correlation. (Standard conditions for all gas and steam volumes in this study are 60°F, 30 inches mercury, saturated with water vapor.) The expression for gaseous hydrocarbon yield is:

$$G^* = 24.30 + 7.55 \log (1 + 0.1\ h/w\ \sqrt{Px}) - 2.40\ C/H \quad \text{(Equ. 2)}$$

The arithmetic average deviation of Equation 2 from 105 sets of laboratory data is 0.44 std. cu. ft./lb. or approximately five per cent. Here again the elimination of runs at operating conditions other than 1550°F and 2.5 seconds residence time would only result in a minor reduction of the average deviation if extreme time-temperature conditions for the very easily cracked oils and the highly refractory (high C/H ratio) oils are excluded.

In the range of hydrogen partial pressures and cracking temperatures where there is no net production of hydrogen from the oil, as in carburetted water gas operation, the value of G* corresponds to the oil gas yield per pound of oil calculated directly from the make gas analysis. For this purpose, oil gas is taken as the total gaseous paraffins and olefins (illuminants) produced. The values obtained from the difference of make gas and base (carrier) gas volumes *(19)* or the Pacific Coast *(35)* method will not check since these methods of calculation do not take the effect of hydrogen absorption into consideration.

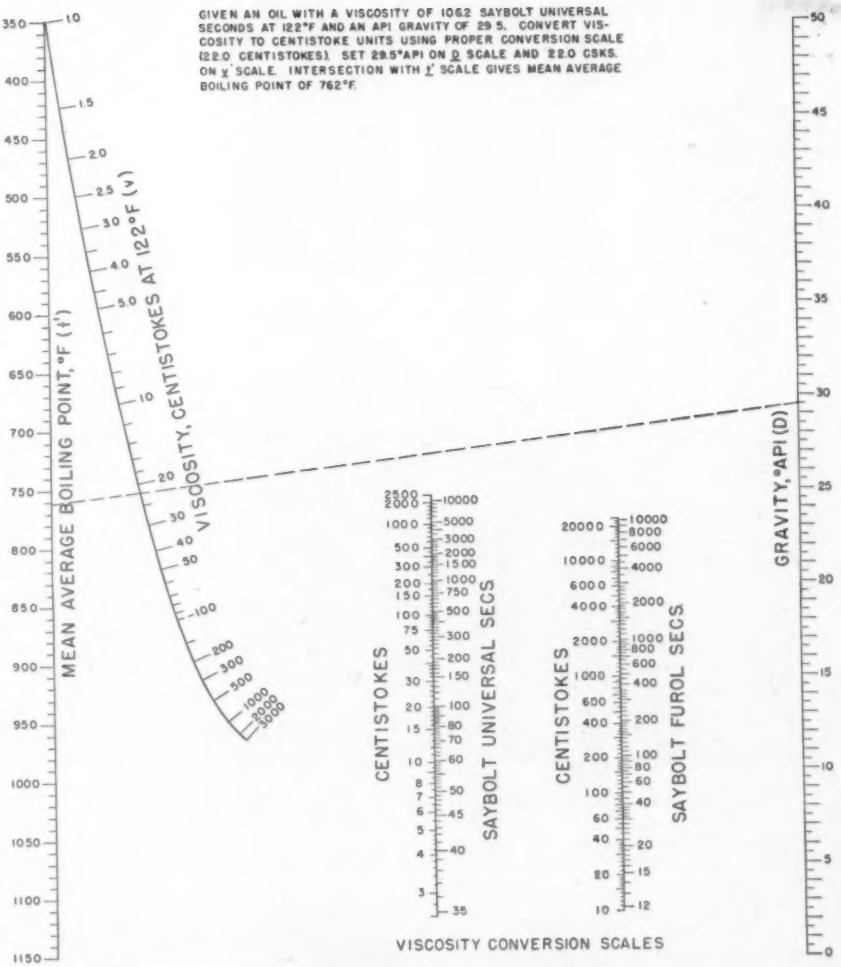

GIVEN AN OIL WITH A VISCOSITY OF 1062 SAYBOLT UNIVERSAL SECONDS AT 122°F AND AN API GRAVITY OF 29.5. CONVERT VISCOSITY TO CENTISTOKE UNITS USING PROPER CONVERSION SCALE (22.0 CENTISTOKES). SET 29.5°API ON D SCALE AND 22.0 CSKS. ON ν SCALE. INTERSECTION WITH t' SCALE GIVES MEAN AVERAGE BOILING POINT OF 762°F.
MEAN AVERAGE BOILING POINT, °F (t')
VISCOSITY, CENTISTOKES AT 122°F (ν)
GRAVITY, °API (D)
CENTISTOKES
SAYBOLT UNIVERSAL SECS
CENTISTOKES
SAYBOLT FUROL SECS
VISCOSITY CONVERSION SCALES

Fig. 4—Nomograph for Estimating the Mean Average Boiling Point of Liquid Petroleum Fractions.

Whenever there is net hydrogen production as in high Btu oil gas or Pacific Coast oil gas manufacture, the volume of hydrogen liberated per pound of oil (H) must be added to G*. In the absence of feed hydrogen, that is, no hydrogen in the base gas, the volume of hydrogen liberated seems to be primarily a function of cracking temperature and independent of residence time and pressure within the limits investigated here. A condition of pseudo-equilibrium is apparently reached. These values as derived from the cracking test data of this investigation and those by Wheeler and Wood *(21)*, Hague and Wheeler *(20)*, and White *(36)* are tabulated at the bottom of this page.

As the hydrogen to oil feed ratio (h/w) is increased towards these "equilibrium" values the quantity of hydrogen produced is reduced.

The tar plus carbon yields (w_{tc}) in weight per cent of feed oil were correlated with the estimated enriching values (E) and standard heats of combustion (Q) expressed in Btu/lb. The heats of combustion of the oils were estimated from an existing correlation with the C/H ratio. *(37)* The fact

(Continued on page 57)

Cracking Temperature °F	Equilibrium Hydrogen Yield (H) Std. Cu. Ft./Lb. of Oil
1200	0.5
1300	0.9
1400	1.7
1500	2.7
1600	4.4
1700	7.3

Director
C. P. de Jonge

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A. E. Englebright

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A. F. Bridge

President-Elect
N. Henry Gellert

Vice-pres.-Elect
E. G. Lawson

Director
Thomas T. Arden

Top Brass of Pacific Coast Gas Ass'n.

Well-earned Honorary Memberships were bestowed on these so-called "Old-timers": left to right: William M. Henderson, formerly with Southern California Gas Co.; H. R. Basford, of H. R. Basford Co., and Frank Wills, Pacific Gas & Electric Co.

National Coverage—Louis Ruthenberg, President, Servel, Inc., Evansville, Ind. (left) and Eugene Bashore, vice-president, Blythe & Co., New York (center) chat with Robert A. Hornby, vice-president, Pacific Lighting Corp.

Convention Candids

Below—"The captains and the kings" of the '49 PCGA convention at Santa Barbara. Seated, left to right, are: Clifford Johnstone, managing director; Arthur F. Bridge, President; and N. Henry Gellert, President-Elect. Standing is the general chairman of the convention, George W. Smith, of Santa Barbara.

Above—Award Winners of the '49 PCGA year. Left to right are—E. A. Reps, Southern Counties Gas Co., Gold Medal Award; F. S. Parmenter, Southern Counties Gas Co., with the Basford Trophy; A. B. Cates, Jr., Southern California Gas Co., chairman of the Awards Committee; and R. D. MacMahon, Southern California Gas Co., Gold Medal Award. Harry J. Keeling, Southern Counties Gas Co., Gold Medal Award, was not present.

Pacific Coast Ass'n Considers Load Balancing Problems

by Arthur Rohman

TODAY as in 1854 when gas was first introduced into San Francisco, the Pacific Coast Gas Association is confronted with two major jobs: "How to get enough gas and how to sell it."

With that statement President Arthur F. Bridge opened the 56th Annual Convention of the Pacific Coast Gas Association before 800 delegates at the Lobero Theater in Santa Barbara, California, on September 7.

A comprehensive program covering in detail the industry's current problems, touching on the international situation, and outlining ways of offsetting the growing trend towards the "welfare state" was arranged by Program Chairman Robert A. Hornby, vice-president, Pacific Lighting Corp.

While the basic jobs remain the same, a new set of factors affect their accomplishment. Today the Pacific Coast gas industry operates under rapidly changing economic conditions. "The shift from deficiency to oversupply in certain basic commodities, particularly fuels," stated Mr. Bridge "is unprecedented in our recent history."

Problems facing western gas utilities include: A need for rate relief; meeting increased electric competition for the basic cooking and water heating loads; loss of industrial revenue to low cost oil; a growing non-competitive, seasonal space heating load supplied at higher cost than that of other load components; lack of an adequately trained dealer sales force, and difficulties imposed by conflict between state and federal regulation.

One other basic problem received prominent attention on the program—that of the industry's human relations—with government, employees, manufacturers, dealers, customers, and stockholders. The impression gathered as the convention progressed was that this problem, perhaps the most complex of all, is one that will increasingly demand more of the time, attention, and considered thought of the industry's forward looking executives.

The international situation was brought to the attention of the delegates by Lieutenant General Ira C. Eaker, USAF retired, pioneer airman and World War II commander of the 8th Air Force.

National Assn's Represented

The program presented three speakers from the industry's national associations. John W. West, Jr., American Gas Association, outlined the activities which the Association carries on for its members, with a breakdown of the money spent for various projects. Out of each dollar received by the Association, 76 cents goes for research, advertising and promotion.

H. Leigh Whitelaw, Gas Appliance Manufacturers Association, attacked excise taxes on home appliances and outlined some of the steps being taken by GAMA in an attempt to have them repealed.

Harold Massey, also of GAMA, spoke at the manufacturers luncheon on requirement standards for major appliances as recently released. Touching on promotional activities, Massey stated that 1949 advertising appropriations for ranges total $576,000; for water heaters and refrigerators, $130,000 each.

The economic value of good employee relations was emphasized by A. W. Turner, supervisor of compensation and safety, Southern California Gas Co., who spoke on the subject, Safety Pays Off. He stated that while the emphasis has always been on the correction of mechanical hazards, research has shown that 90 per cent of accidents are the result of human failures and that safe and efficient operation are synonymous.

Eugene Bashore, vice-president, Blythe & Co., speaking on New Money in our Expanding Facilities stated: "A contracting economy represents unemployment, distress, and social unrest. The expansion of the gas business is providing not only $800,000,000 annually for construction, most of which goes to labor, but it is creating new permanent jobs at the rate of 15,000 per year with $45 millions of annual pay."

Three-Fold Solution

Current problems of supply are being met through the construction of large diameter long distance transmission lines from New Mexico and West Texas. The ramifications of supply were discussed in detail in a symposium led by J. S. Moulton, vice-president and executive engineer, Pacific Gas and Electric Co., and participated in by William Moeller, Jr., vice-president, Southern California Gas Co., and E. L. Hall, director of the AGA testing laboratories at Cleveland.

Basically the solution to the load balance problem in California, which is generally applicable to all natural gas territory, was seen to lie in:

1. Revised rate schedules for space heating.

2. The retention and development of flexible gas supply. The conservation of dry gas in northern California and the development of further underground storage in southern California.

3. Increased sales effort, particularly for the domestic cooking and water heating loads.

What the East Is Doing

The methods by which eastern gas utilities meet peak load problems were discussed by Mr. Hall. There relatively light oil has been used for gas making, but equipment is now being installed utilizing Bunker C oil to further reduce the cost of gas made. With present Bunker C oil prices, the cost of making 1000 Btu gas in New England compares favorably with the proposed cost of natural gas delivered into the region, according to Mr. Hall.

Need for a revitalized sales effort was the crux of a symposium on the Buyer's Market led by F. M. Banks, vice-president and general manager, Southern California Gas Co. Other participants were O. R. Doerr, vice-president, Pacific Gas and Electric Co., and W. Hubert Tappan, vice-president, Tappan Stove Co.

The present focal point of attack on the sales problem is through the dealers and their sales personnel, according to Mr. Banks, but utility sales executives should gear their thinking to the possibility of direct merchandising, a step that may some day be necessary.

The need for aggressive sales action is revealed by the changing sales ratio of gas to electric appliances. Gas ranges were 14.2 to 1; gas water heaters, 5 to 1 over electric in 1939. By 1948 the sales ratio for ranges had been cut to 1.8 to 1 and for water heaters to 1.4 to 1.

Stating that the dealer was the joining force between customer and utilization, Mr. Doerr placed the responsibility for good dealer relations on the utilities. Utilities must assume and fulfill certain responsibilities with the dealer, as they have done with the manufacturer, in order to produce a maximum effort.

Mr. Tappan reiterated the need for trained sales personnel in gas appliance merchandising. To offset erratic merchandising policies, he proposed the compilation of a blue book of trade-in values for older gas appliances.

Louis Ruthenburg, board chairman of Servel, Inc., in his address, Business Management in a Changing Economy, pointed out that the sales force of the industry is pathetically undermanned, an estimate being that not more than 1500 strictly gas utility salesmen are operating in this country. This fact he projected against a published prediction by the president of a large electrical appliance manufacturing company that before long an army of 150,000 salesmen would be pushing the sale of electrical appliances.

Considerable attention was given to the growing tendency in government towards collectivism or the "welfare state." Dr. Emerson P. Schmidt, director of economic research for the U. S. Chamber of Commerce, stated that with the support of the labor movement, government aims are (1) to socialize further not only property but income; (2) to displace the free market as the guide to our economic activities in favor of a system of administrative directives.

Employees Are Individuals

George T. Fonda, Weirton Steel Co., highlighted a discussion of labor-management relationships. Weirton has not had a work stoppage in 16 years, Fonda declared, which is a tribute to the relations existing between the company management and the Weirton independent union. Fonda attributed his company's success in management-labor relations to the fact that management deals directly and fairly with the men, treating them as individuals. The company recog-

nizes grievances promptly and explains to employees where the granting of some requests would place the company in an unfavorable competitive position.

L. E. Purvis, staff member, Opinion Research Corp., Princeton, N. J., speaking on the topic Measuring Employees Attitudes and Information—The High Cost of Economic Ignorance, stated that "there never has been a time in American history when the public has been more willing to question the social implications of business decisions."

Information Is Vital

Top management, Mr. Purvis said, must become aware of the need for dispensing accurate information to employees and the public regarding plant operations, not only from the technical viewpoint but also from the aspect of the sociological importance of the plant and its products and the jobs created for members of the community.

Facts gathered by Opinion Research reveal that: (1) Americans are still primarily capitalistic; (2) Most people are satisfied with their jobs; (3) Job satisfactions have spiritual as well as economic factors; (4) Job dissatisfaction is linked with the desire for state control; (5) That there is great ignorance of simple economic facts; (6) That this ignorance is closely related to belief in statism.

Awards Are Made

The work of the various sections and committees was carried on during the year through the medium of group conferences, correspondence and meetings for groups interested in specialized problems. The conference method, adopted several years ago by Managing Director Clifford Johnstone, has proved a successful means of accomplishing the most work in the least time.

The excellence of the work of the various sections was noted by the Awards Committee with the accomplishments of the Technical and Sales and Advertising Sections judged as outstanding. The Basford trophy was awarded to the Sales and Advertising Section, F. S. Parmenter, Southern Counties Gas Co., chairman.

Gold medal awards were presented to the following:

Harry J. Keeling, Southern Counties Gas Co., for his paper on "Mobile Radio Communication for Gas Transmission."

R. D. MacMahon, Southern California Gas Co., for work in connection with the booklet on volume water heating.

E. A. Reps, Southern Counties Gas Co., for his paper "New Meter Repair Shop."

Honorary Memberships

Three former gold medal winners of PCGA, Harold R. Basford, president in 1924 and donator in perpetuity of the Basford Trophy; Frank Wills, contributor of many scholarly technical works, and W. M. Henderson, 43-year member, were awarded honorary memberships in the Association at a ceremony presided over by Franklin S. Wade, President, Southern California Gas Co.

For his many years of service J. L. Lewis, who retired from Grayson Controls Division of Robertshaw-Fulton Controls, Ltd., was given a citation by the Association's commercial cooking committee.

Officers elected to lead the Association in 1950 were as follows:

President: N. Henry Gellert, President Seattle Gas Co.

Vice-president: E. G. Lawson, President, Pacific Public Service Co., San Francisco.

Treasurer: D. G. Martin, general auditor, Pacific Gas and Electric Co.

Directors: T. T. Arden, executive vice-president, Grayson Controls Division, Robertshaw-Fulton Controls Co.; C. P. de Jonge, superintendent, gas department, San Diego Gas and Electric Co.; A. E. Englebright, vice-president and general manager, Honolulu Gas Co.; R. T. Richards, assistant general superintendent, Central Arizona Light and Power Co.

Appointed to head the Technical Section for 1950 was Ray W. Todd, of Pacific Lighting Corp. J. L. Hall, Southern California Gas Co., was named chairman of the Sales and Advertising Section, while John E. Wolfe, Pacific Public Service Co., will head up the Accounting Section.

The manufacturers Section reelected C. A. Gabriel, President, Monarch Heating Co. as general chairman, while T. T. Arden was renamed vice chairman.

Ponder Changeover Problems At N. J. Ass'n. Annual Meet

New Jersey Gas Ass'n officials flank two of their guest speakers. Left to right: Howard H. Melvin, President; Dr. Wayne Orton, of IBM; Hugh H. Cuthrell, of Brooklyn; and E. A. Smith, secretary-treasurer. The photograph is by courtesy of IBM.

The changing complexion of the gas industry along the Atlantic seaboard, as it is being affected by the introduction of natural gas into this, the greatest gas market in the world, was the recurrent theme of several addresses delivered before the New Jersey Gas Association at its annual convention held September 9 at Spring Lake, N. J.

Leaving the discussion of technical problems to the afternoon symposium, Hugh H. Cuthrell, Brooklyn, first vice-president of the American Gas Association, launched into the economic implications of the coming of natural gas. "One simple fundamental economic truth bears repeating," he said, "and that is the simple fact that natural gas can be put down on this Atlantic seaboard cheaper than anything we can manufacture . . . it is the keystone to all of the studies we are now making. . . . We should gear our plans to use as much of that natural gas as possible. . . . We should see how high a Btu we can put out as an industry and by all means standardize it at some point if we can."

He urged all companies to go to straight natural gas, or mixed gas of a higher heating value as early as possible, warning however that it will "call for imagination and ingenuity in finding new markets for our product." He further advocated that economies as they are achieved should be passed on to the ultimate consumer. On expansion financing he warned against the temptation to "finance with cheap bonds at low money cost . . .; advising what we need is more equity capital . . . more stockholders . . . greater general interest in our business."

The natural gas symposium, core of the afternoon meeting, was marked by intense and practical concentration on the problems that the New Jersey companies will meet when they begin receiving natural gas in volume in 1950 and thereafter. Robert H. Phillips, Newark, outlined the history of natural gas planning for the state from the early 1930's when gas from the Appalachian area was first proposed, but later found to be not feasible. He called on representative of the Washington (D. C.) Gas Light Co. and of the Philadelphia Electric Co. to disclose many of the problems that have been met and solved as natural gas was brought into those two cities.

Speaking for Washington, Howard B. Noyes described briefly the steps by which his company went from a manufactured gas to a straight natural gas sendout. In 1935 Washington started reforming natural gas and adding it to its water gas sendout at 600 Btu. This was accompanied by a bigger than anticipated house heating demand before the war. Sendout rose from 63 million cu. ft. in 1939 to 100 million in 1942. During the war it was necessary to practically

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Education and Regulation Combined Can Solve Venting Problems

by Carl H. Dean

Director of Education, Domestic Heating Division, Stewart-Warner Corp.

GAS venting is a controversial subject during the discussion of which there are bound to be brickbats mixed with the bouquets. This series has evoked some of each and we appreciate every one.

It is well nigh impossible to have full appreciation of the venting problem without field experience at the dealer level or utility trouble shooting. Obviously everyone cannot have the benefit of these experiences.

We appreciate the constructive criticisms and suggestions which we have received. Some of them form the basis of this final article. One point made was that the gas industry has not had proper consideration by the building industry. When gas was considered a luxury fuel, we were tempted to permit the use of venting installations which were basically unsound in order to promote the sale of gas and gas appliances.

The cleanliness, convenience and versatility of gas encourages its abuse. No one would dare attempt slip-shod methods of venting coal or oil appliances. When homes are to be heated with vented space heaters, the building industry must see that an unobstructable supply of air is always available for combustion and venting of these appliances. The magnitude of the educational program to be conducted along these lines is almost appalling but it must be faced.

Architectural Forum observes that there are some two thousand laboratories conducting housing research throughout the United States. Each one of these should be made aware of the advantages and ever increasing availability of gas and the fact that gas is no longer a luxury fuel.

Our appliances are basically sound. Of course they can be improved and are being improved, constantly. The results of the efforts of the AGA Testing Laboratories in the last quarter century have been excellent. The term "vented appliance" remains a misnomer, however, since we do not provide all-inclusive specifications covering the phase of the installation which

This is the last of a series of four articles which Mr. Dean has contributed to AMERICAN GAS JOURNAL.

makes the unit a vented appliance. This we must do. The Laboratories can police the manufacture of equipment but they cannot and should not be expected to police the applications. That is not their job.

The utility, the appliance manufacturer, the appliance dealer and installer do not exist to themselves alone nor are they subordinate to each other. They are subordinate only to the main purpose, service to the public. To this end we must coordinate all of our efforts.

Criticism is sometimes made of perfectionist thinking. Should we aim at anything short of perfection? Granted that the state of perfection when attained might prove monotonous with nothing to gripe about except possibly the fact that there would be nothing to gripe about. Be of good cheer. At our present rate of progress we need not be too concerned about this condition coming to pass, so we must not lower our aim.

Need Faster Fact Dissemination

It is suggested that education rather than regulation is the answer to the situation. Most certainly this is always the ideal method when the means are available. No one can belittle the research that has been conducted on venting, or the excellent findings which have followed this work, in some sections of the country. But the results of this work should be made available to the entire market. One reason for national standards is that the dissemination of the results of venting research is not rapid enough.

Education *is* the answer to the problem; but that education must start at the top and filter on down. Meanwhile the installation level must be properly regulated. It is being and will be regulated anyhow, and it is up to us to see that it is done wisely.

Vapor control in the home is one of the most vexatious problems in residential construction today. In some localities we have attempted to handle the entire heating load with unvented heating appliances. This has contributed to the condensation nuisance making all gas appliances suspect in the new types of construction which have many condensation problems. We know that ranges and refrigerators do not use enough gas to require venting. We also know that every kitchen requires ventilation regardless of the type of equipment used. This is not to be accomplished simply by the installation of an exhaust fan without consideration of a source of air supply to replace the air thus exhausted.

In many sections of the country there is a trend toward house heating by individual space heaters especially where basementless houses are built on concrete slabs. These space heaters are of many types but in most cases they depend on room air for combustion and venting. Where kitchen exhaust fans or wood burning fireplaces are used without provision for an air supply, negative interior pressures often result. These will reverse the action of the flues with consequent spillage of combustion products at the draft diverter. This in turn will aggravate the vapor problem in the home.

Builders Must Cooperate

We should demand that the building industry provide air sufficient for the proper combustion and disposal of the products of combustion of gas just as they are required to do when competitive fuels are used. This air must be introduced in a manner which will not cause objectionable drafts which would lead to the owner blocking the supply inlets.

Many authorities consider that the forced air heating industry has the answer in its hands, especially since they have finally recognized the desirability of continuous air circulation. Exhaust grills in kitchens and bathrooms with stacks to the outside atmosphere, combined with filtered fresh air inlets to introduce 150 per cent of the volume of

air delivered by the heating system will do much to solve many problems.

These rooms are the source of most of the vapors produced by normal housekeeping procedures. With controlled air circulation and regulated introduction of fresh air, negative interior pressures and consequent backdrafts and combustion products spillage at draft diverts would be eliminated. Vapors and odors would be removed at their source thus correcting one of the major objections to this type of heating—that is, the dissemination of odors throughout the house. The resulting heat loss would not exceed normal infiltration and the vapor content of the air in the home could be controlled.

Other types of heating require individual methods of vapor and fresh air control. None of these items present impossible problems when the problems are admitted to be present, and attention is directed toward correcting the conditions. The handicap is when some section of the industry, which does not consider itself involved, denies the existence of a problem which is vexing another section. Any utilization problem of any section of the gas industry is a problem affecting every section.

Just Say Aspirin

We have not touched on the venting of space heaters. Surely this item is elementary. It is customary to install such heaters adjacent to a flue and in the case of wall units with a vertical vent, observance of the rudiments of venting should suffice. In either case just as when boilers or furnaces are installed in little interior closets, there must be unobstructable, copious outside air supply.

A final word about regulations. They must be simple, concise, yet comprehensive. The terminology must be intelligible to the man in the street. Rulings which require clarification are ineffective. We are not writing prescriptions and when we mean aspirin we should not confuse the issue by saying acetyl derivative of salicylic acid. Just say aspirin. And do not omit a single requirement. Remember the lady who called the gas company about excessive condensation in a room heated by an open flame heater. She was told to install a vented type heater. A month later she complained that there was no improvement. A service call uncovered the fact that while she had purchased a vented type heater, no one had told her that it must be connected to a flue. Any specifications which can be followed to the letter and still result in an inadequate venting installation are not suitable for our purpose. It may be found necessary to provide rules for each type of appliance rather than to attempt to furnish a single set of regulations to govern all installations.

Again let us thank everyone who has assisted us in this presentation with comments, criticisms and suggestions. A constant awareness of the existence of the problem will lead to the eventual solution. It is nothing to be ashamed of or to be covered up for fear of its being used by competition. It is relatively simple when compared to an item like overloaded circuits in homes which causes sleepless nights in the electric industry. Their constant efforts to educate their customers regarding the hazards inherent in the use of their product are to be considered as an admirable example for all to emulate.

Motion Picture Is Used to Sell Stock of Rochester Gas & Electric

Motion pictures were used as a medium for acquainting prospective investors with the company in connection with the recent sale by General Public Utilities Corp. of its entire common stock holdings in Rochester Gas and Electric Corp. of Rochester, N. Y.

In similar transactions in the past the usual method has been to send a group of top executives around the country to talk to security dealers and prospective investors, or to make up several crews, each of whom had to carry truck loads of charts and exhibits.

In this instance General Public Utilities and Rochester Gas and Electric filmed a 16mm. sound motion picture which could be shown simultaneously to security dealers in various cities. This eliminated the necessity for shipping truck-loads of exhibits from city to city, and insured uniform presentation of facts regarding the securities offered for sale.

The sound picture, titled "Progress and Power in Rochester and the Genesee Valley," is a three-part presentation in color. The first part is a short address by GPU President Albert F. Tegen outlining the reasons for the relinquishment of the Rochester utility. The second, and longest part, shows the operations and facilities of the operating company, as well as the character of the community it serves. The closing part is a detailed analysis by James A. Lyle, vice-president of First Boston Corp., in which he describes the manner of security dealer participation in the program.

The film was so produced that the center portion can be used as a public relations vehicle for the Rochester utility in its own area.

Subjects of Topical Interest Are Announced for Personnel Conference Nov.28-29

The Netherland Plaza Hotel at Cincinnati will be the scene of the National Personnel Conference of the gas industry on November 28 and 29. More than 100 industrial relations people are expected to attend.

The conference is sponsored by the Personnel Committee, Midwest Personnel Conference, the Great Lakes Personnel Conference of the American Gas Association and by the Personnel Section of the Southern Gas Association.

Leslie A. Brandt, chairman of the AGA Personnel Committee and director of employee relations for The Peoples Gas Light and Coke Co., will open the two-day meeting. H. Carl Wolf, AGA managing director, will bring a message from the association, following which Dr. Robert K. Burns, executive officer of the Industrial Relations Center of the University of Chicago, will discuss some studies conducted by the Center on supervisory training programs in industry.

W. C. Beckjord, President, Cincinnati Gas and Electric Co., will address the luncheon meeting on the importance of an integrated employee relations program.

Some pension problems confronting the industry will be explored by Eskil I. Bjork, vice-president of The Peoples Gas Light and Coke Co., and Dr. Rensis Likert, director of Survey Research Center, University of Michigan, will review studies made by the Center on employee performance as related to the performance of their supervisors.

Need for systematic wage and salary administration will be discussed by Dr. Jay Otis, director, personnel Research Institute, Western Reserve University. Several personnel men from the gas industry will discuss absenteeism experience and its control, including the results of industry surveys on absenteeism and fringe benefit costs.

Three concurrent luncheon meetings of the Personnel Section of the Southern Gas Association and the Midwest and Great Lakes Personnel Conferences of the AGA will be held, with "round-table" discussions at each

Utility Employees in Fourteen States Get 1949 Wage Increases

by James H. McGourty
Labor Relations Analyst

Utility Companies Increase Wages

James H. McGourty

A RECENT survey shows that producers of gas, light and power in upper New York, Pennsylvania, Georgia, Florida, Alabama, Mississippi, Ohio, Indiana, Minnesota, Washington State, Connecticut, Iowa, Illinois and Missouri have given wage increases affecting 34,700 employees.

Of these employees 30,700 received their increases in the second quarter of 1949. The figures supplied show an average of $.0760 per hour increase. About 50 per cent of the companies included in the survey gave increased benefits in the so-called fringe issue class. Most of the workers were represented by the International Brotherhood of Electrical Workers, AFL and the United Mine Workers of America, District 50, Independent.

The economy of the public utility industry is affected by the eleven unions listed below. The table indicates the amount of average cents per hour in increases won by these unions in the past nine month period.

Auto Workers, CIO	6.6
Chemical Workers, AFL	7.7
Gas, Coke and Chemical Workers, CIO	8.3
United Electrical Workers, CIO	5.9
Inter. Brotherhood Electrical Wkrs. AFL	10.5
Fur and Leather Workers, CIO	7.4
Machinists, Independent	8.2
Mine, Mill and Smelter Workers, CIO	1.0 less than
Mine Workers, District 50, Independent	6.2
Steel Workers, CIO	6.1
Utility Workers, CIO	8.5

Factors, Pro and Con the Fourth Round

An independent survey, embracing general manufacturing, banks, transportation, public utilities, retail, wholesale and communications—all on a nationwide basis—shows that 40 per cent of contracts negotiated give wage increases. Five cents looks like the figure. Thirty per cent of the contracts give no wage increases.

Among those industries giving wage increases, public utilities and building materials are the most prominent. AFL unions are 100 per cent ahead of CIO unions in obtaining wage increases, while Independent unions lag behind both AFL and CIO. Only 16-2/3 per cent of the contracts increased or initiated fringe issues. Six paid holidays still seem to be the order of the day. Of the 30 per cent "no wage increase" contracts mentioned above, 57 per cent provide for wage reopening during the term of the agreement. The large portion of these reopenings are due to occur in the fall.

This indicates, of course, an effort on the part of the unions to hedge. Since the survey above was made, President Truman's Steel Fact Finders have met, heard the cases for both the steel industry and the United Steel Workers, CIO, and have recommended that:

1. The United Steel Workers withdraw its fourth round demands.
2. The steel companies finance pension and social insurance programs for employees.
3. Steel workers forget originally contemplated $.30 package, including $.12½ hourly wage increase.
4. Steel prices should not go up as a result of the pension and insurance program but rather, provided conditions continue favorable, the steel companies should reduce steel prices. Further, the Board feels that if steel prices are not reduced, in the face of continuing favorable conditions, labor would be justified in demanding an hourly wage increase.

The Board estimated that the cost of the pension and insurance program, after deductions for existing welfare plans, would amount to about $.08 per hour per worker. Since steel workers average earnings come to "conservatively" $1.60 per hour, the Board continued to reason that the $.08 per hour would cause a five per cent increase in direct labor costs. The Board assumes that labor to total cost is about 50 per cent and that the increase would amount to only 2½ per cent at an operation rate of 2000 hours per year.

Arbitrators Have Found That:

Layoff for a short time due to a shortage of material need not be governed by seniority restrictions.

Where the contract provides nothing to the contrary, management has the right to subcontract work, even though regular employees of the company are deprived of overtime work.

An employee does not lose his seniority when transferred to a supervisory job unless the contract specifically provides for such loss.

Where because of technological changes jobs are done away with and work is reduced, management must negotiate the issue of work loads with the union.

NLRB Holds That:

Discharge was not discriminatory when employees admitted violation of company rule concerning absence and neglect of work.

When employees on picket line using obnoxious language were discharged, NLRB ruled discharge not discriminatory, especially since other employees would not work if offending employees were reinstated.

In the case of International Union, United Mine Workers of America (Ind.) and John L. Lewis, President, vs Jones & Laughlin Steel Corp. *et al.*, the union and its President violated section 8 (b) (2) of the amended National Labor Relations Act by attempting to and causing these employers to execute an unauthorized union-shop agreement. This action resulted in discrimination against employees within the meaning of section 8 (a) (3) of the act. The union further violated the act by striking in support of its demands.

The union as well as the employer is liable for lost wages if a worker is discharged in compliance with union request, in a plant where a union shop contract has not been legalized by union shop election.

A worker could be discharged, when because of personal resentment, said

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Varied Legal Decisions Reviewed

by Leo T. Parker

Attorney at Law, Cincinnati, Ohio

CONSIDERABLE discussion has arisen from time to time over the legal question: Is it possible to change gas rates specified by a valid contract between a gas company and a municipality? According to a recent higher court the basic purpose of the Natural Gas Act is "protection" of the public interest. Therefore, although a Public Service Commission has no jurisdiction to fix or regulate in intrastate sales, yet since the cost to the ultimate consumer at retail is materially affected by the sale price of the gas from the wholesaler to the retailer, this factor will be given considerable weight by the Commission in choosing between two competing applicants.

In view of this established law under normal conditions an order of the Federal Power Commission granting a certificate of public convenience and necessity may be set aside *only* when the evidence shows conclusively a new gas corporation will not serve and increase public convenience or that the applicant is not in a position to supply the public need of the general public.

For example, in Kentucky Natural Gas Corp. v. Federal Power Commission, 159 Fed. Rep. (2d) 215, it was shown that two competing gas corporations applied for certificates to transport and sell gas to Kentucky consumers. The testimony showed that the Central Illinois Public Service (referred to as Central Illinois) owns and operates a natural gas transmission pipe line system in the State of Illinois. The present pipe line system of Central Illinois was decided to be inadequate to supply the future demands of consumers in the communities which it now serves in the Mattoon area due to lack of capacity of such system west of Paris, Ill. In order to increase its present system capacity, to the extent required to supply adequately its present market with natural gas purchased at the Illinois-Indiana state line, it will be necessary for Central Illinois to expend considerable money. The corporation was willing to expend the necessary amount of money for this purpose.

The Commission decided that (1) public convenience and necessity do not require the issuance of a certificate of public convenience and necessity to the Kentucky Natural; (2) it is in the public interest that the Central Illinois be authorized to construct and operate the proposed transmission pipe line between Tuscola and Mattoon, Ill., as an integral part of its transmission pipe line system, and obtain its natural gas supply directly from the Panhandle; (3) the delivery of the natural gas requirements of the Central Illinois will not place any undue burden upon the Panhandle, and will not impair its ability to render adequate service to its customers; (4) the construction and operation by the Central Illinois of the additional facilities is required by public convenience and necessity, and a certificate authorizing such proposed construction and operation *should be issued;* and (5) the Central Illinois is able and willing to expend necessary money to perform the service proposed, and to conform to the provisions of the Natural Gas Act, and regulations of the Commission.

Higher Court Approves

The higher court reviewed all testimony and approved the decision of the Commission. This court said:

"Where two competing applicants are both qualified to perform the proposed service, the Commission is necessarily called upon to rule in favor of one and against the other. Such a ruling can not be set aside on this review unless shown to be arbitrary. . . . We believe that the fact that the construction of the proposed new facilities at an estimated cost of $182,900 would eliminate the necessity of the expenditure of at least $350,000 by Central Illinois for otherwise necessary improvements and additions to its present facilities, and the fact that the proposed new facilities will enable it to obtain its gas requirements for the Mattoon area direct from Panhandle instead of indirectly from Panhandle through Kentucky Natural are by themselves of sufficient controlling importance to justify the ruling of the Commission in granting the certificate of public convenience and necessity to Central Illinois instead of to Kentucky Natural, both being otherwise qualified applicants. The elimination of an unnecessary middleman between the wholesaler and the retailer is a material benefit to the ultimate consumer at retail."

Common Carrier of Gas

According to a recent higher court a gas company may become a common carrier of gas by accepting advantages or benefits from the government. Also, once these benefits are accepted and the gas company becomes a legal common carrier of gas, its business relationship and responsibilities cannot be shifted.

For example, in Montana - Dakota Utilities Co. v. Federal Power Commission, 169 Fed. (2d) 392, it was shown that a natural gas company constructed a pipe line in part upon rights of way over government owned lands under permits issued by the Secretary of Interior. This permit was issued pursuant to a leasing act authorizing the secretary to grant rights of way through public lands for pipe line purposes for transportation of natural gas providing the pipe lines are operated as common carriers.

In subsequent litigation the gas company's officials testified that the company was not being operated as a common carrier of gas and desired rates for gas not subject to the jurisdiction of the Federal Power Com-

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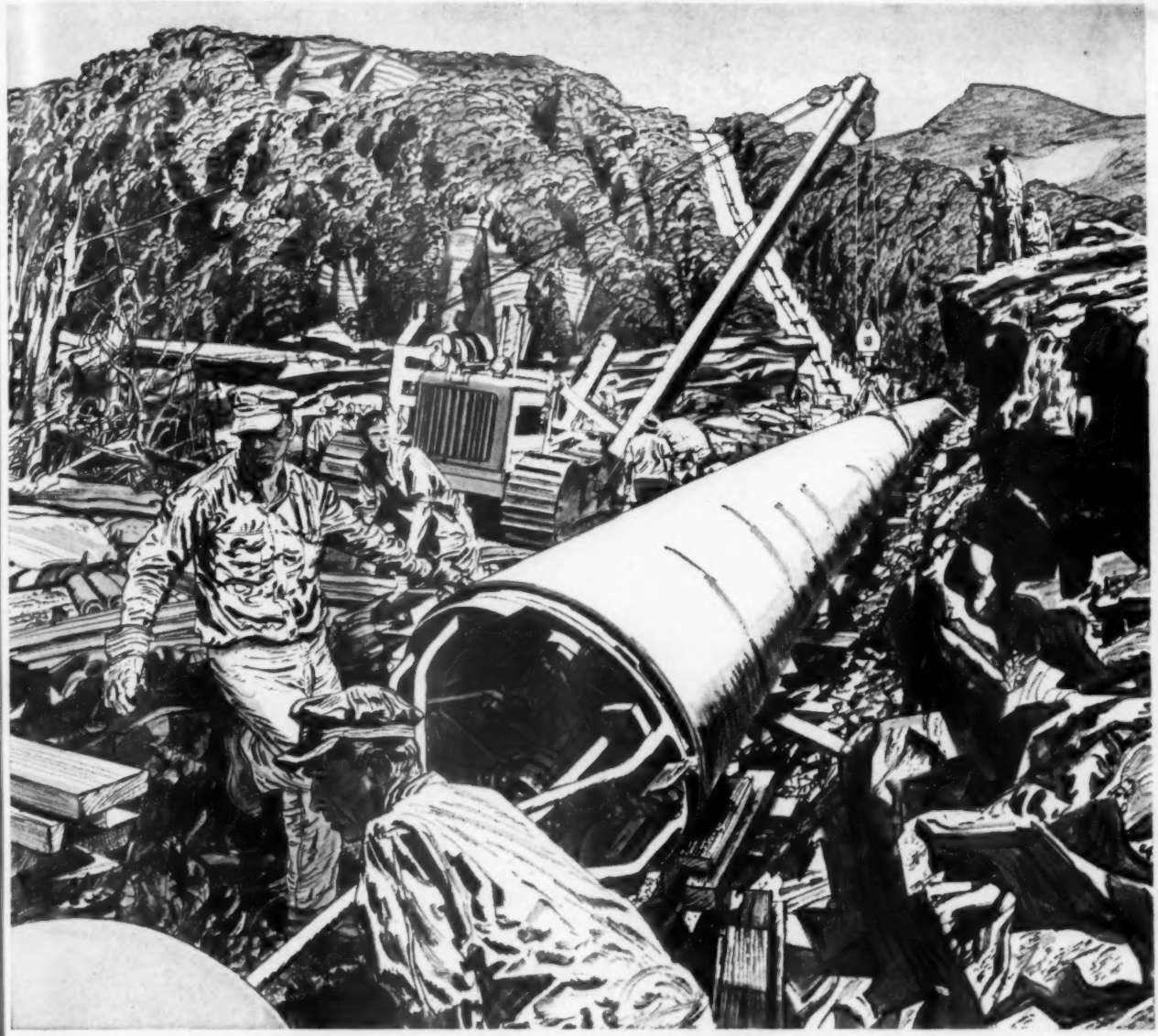

Pipeline Men Call it
THE TOUGHEST INCH

The Big Inch and Little Big Inch are much longer. Other pipelines have more "inches" of diameter. But none has been tougher to build than the Columbia Gas System's "Toughest Inch". Rugged men and massive machinery are fighting the mountains and rocks and rivers of West Virginia to lay this giant steel tube from near Charleston, W. Va., to Rockville, Maryland.

The results will be well worth the battle.

When completed next year, this line will help meet the increasing demands for natural gas in the nation's capital. In Baltimore, more than a quarter million families will gain for the first time the advantages of the cleanest, most convenient, most economical of all standard fuels.

This is a rugged project. But it is typical of American engineering, continually working to advance the country's living standards. The Toughest Inch is a typical Columbia Gas System effort, too—characteristic of the natural gas industry's desire to serve more people with more of nature's best and most wanted fuel.

This year, The Columbia Gas System, Inc., Columbia Engineering Corporation and 18 operating subsidiaries will distribute more than 250 billion cubic feet of gas to customers in seven states and the District of Columbia.

The Columbia Gas System, Inc.

120 East 41st Street, New York 17, N. Y.

News of the Gas Industry

Bradford Is Manager of New Ebasco Office in Chicago

Rolland H. Bradford

Ebasco Services Inc. has opened a Chicago office at 209 South La Salle St., according to an announcement by T. C. Wescott, President. Ebasco has headquarters at Two Rector St., New York City.

The new Chicago office, according to Mr. Wescott, has been set up for the purpose of bringing about a closer relationship with the Ebasco staff and its clients in the western and mid-western areas. It will be managed by Rolland H. Bradford, a native of Missouri, who has spent more than 20 years with the Ebasco organization and its affiliates.

Mr. Bradford is a graduate of the University of Arizona, with a BS in civil engineering. His background includes diversified experience in utility operation and management.

Mississippi River Fuel Seeks to Increase Capacity

Mississippi River Fuel Corp. of St. Louis, has filed an application with the Federal Power Commission proposing to increase the daily sales capacity of its natural gas transmission system of 328,000,000 cu. ft. by the installation and operation of additional compressor units in Louisiana, Arkansas and Missouri.

The company proposes to use the additional facilities: (1) to meet the increased demands of its existing customers; (2) to deliver natural gas for distribution in 29 communities in Arkansas and Missouri which are now without natural gas service; and (3) to connect additional main line customers which will use natural gas for industrial purposes in Arkansas, Missouri and Illinois.

The proposed construction program includes installation of compressor units totaling 13,000 horsepower in three new stations and additions totaling 3,000 horsepower to two previously authorized compressor stations.

Mississippi's transmission system extends from northern Louisiana through Arkansas and Missouri and into Illinois.

Arkansas Louisiana Company Gets Go-Ahead from FPC

The Federal Power Commission has authorized Arkansas Louisiana Gas Co., of Shreveport, to construct and operate additional natural gas facilities, including about 163 miles of 20-inch pipe line, in Texas, Arkansas and Louisiana. Estimated cost is $7,618,500.

Under the authorization, the company will build a 72-mile line with a capacity of 200,000,000 cu. ft. per day extending from Harrison County, Tex., to Columbia County, and approximately 90.8 miles of line between Columbia County and Perla, Ark. The latter line will have a daily delivery capacity of 140,000,000 cu. ft., the company said.

O. A. Gray Is Sales Engineer for United Engineers

Oscar A. Gray

C. A. Schlegel, vice-president and gas sales manager of United Engineers & Constructors, Inc., has announced the appointment of Oscar A. Gray as sales engineer.

Mr. Gray has been an employee of The U.G.I. Contracting Company and the United Engineers & Constructors Inc. for 27 years. During that period he has served in the capacity of appraisal engineer, engineering assistant in the gas design division, construction superintendent supervising the construction and operation of water gas and coal gas plants, and supervising engineer in the gas design division.

He is a licensed professional engineer, and a member of the Pennsylvania Gas Association and American Gas Association.

Transcontinental Applies to Expand N. Y. Line

Transcontinental Gas Pipe Line Corp. of Houston, has applied to the Federal Power Commission for authorization to expand the capacity of its Texas-to-New York City natural gas pipe line, now under construction, from the presently authorized 340,000,000 cu. ft. per day to a new total of 505,000,000 cu. ft.

The company estimates cost of the expansion at $50,386,000.

G. S. Jones, Jr., Made Chairman of Nat'l Distribution Council

George S. Jones, Jr.

George S. Jones, Jr., vice-president and assistant to the President of Servel, Inc., Evansville, has been named chairman of the National Distribution Council according to a statement by Secretary of Commerce Charles Sawyer, at a recent luncheon meeting of the Council and National Sales Executives at Washington.

The Council is the official advisory body to the Commerce Department on selling, marketing, and distribution materials, and is composed of past and present leaders of national organizations in the field of distribution. The organizations include selling, sales promotion, advertising, sales training, wholesaling and retailing.

Mr. Jones, who is a past president of the National Federation of Sales Executives, has been vice-president of Servel since 1936. He is a former chairman of the Home and Industry Committee and is active in the American Gas Association.

Board Approves Amendments to AGA Constitution

The Executive Board of the American Gas Association on August 31, by unanimous vote, approved two proposed amendments to Article V of the Constitution and Articles III and IV of the By-Laws of the Association. The amendments will be submitted to the membership of the Association at the convention in Chicago on Oct. 18.

The effect of these amendments is: (A) To provide for the appointment of one or more assistant managing directors, assistant secretaries and assistant treasurers to be appointed at the discretion of the Executive Board. (B) To change the name of the Technical Section to Operating Section.

Approval by the membership of the first amendment will permit greater dispatch in handling routine matters requiring action by officers of the association. No additional employees are necessary or contemplated in these appointments. The proposed change in the name of the Technical Section is designed to eliminate confusion arising out of use of the present name and to make it more descriptive of the Section's functions.

How to get your money out of gas . . .

Conversion of natural gas into synthetics, including gasoline, is increasing the need to save gas. Gas conservation is only a fraction of DRESSER INDUSTRIES' service to the oil and gas industry. But in this area, as in others, the Dresser line of equipment ranges in size for the smallest operator up to the largest installations ever built for repressuring, recycling, desulfurizing, for high- or low-pressure storage, for liquefying and for nitrogen removal.

To help you get your money out of gas, Dresser has equipment for returning gas to the ground for storage or for repressuring the well. If your gas is sour, Dresser can sweeten it to piping requirements with automatic Desulfo equipment which requires only a few hours' maintenance a month. Dresser engineers will gladly work with you. Free catalogs are available on all processes and equipment. Write to Dresser Industries, Inc., Terminal Tower, Cleveland 13, Ohio.

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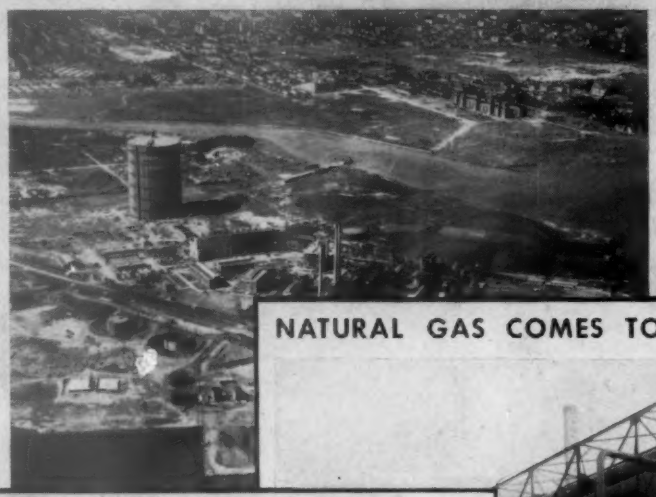
NATURAL GAS FOR THE ASTORIA AND HUNTS POINT PLANTS



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also, a similar 40,000,000 cu. ft. per

The many installations of U. G. I. nap
ness of the design which uses the cata
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The current program of construction which we are conducting at this Plant includes manufacturing, mixing or handling equipment for this unusually large number of different kinds of gases.

The engineering for this construction involves many phases of gas manufacturing technology that are of timely interest to the industry, especially the equipment for handling natural gas.

Our 25 years of associated experience with the use of refinery oil gas for reforming on water gas sets and as cold enrichment, provides the engineering background required for the installation of this natural gas equipment.

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NATURAL GAS FITS INTO THE MANUFACTURED GAS PICTURE

Our current and recent work in making provisions for the utilization of natural gas in manufactured gas plants is another example of continuing progress in fitting available fuels into the manufactured gas picture. To a great extent, this progress is accounted for by the flexibility of the cyclic carburetted water gas process which permits the use of many different kinds of fuels and enrichers.

U.G.I. processes contribute to this flexibility:

Gas Oil	U.G.I. Standard Process
Bunker and Residuum Oil	U.G.I. Heavy Oil Process
Raw Oil Refinery Gas	U.G.I. Reforming Process
L. P. Gases (Propane, Butane)	U.G.I. Reforming Process
Oil Gas	U.G.I. Special Processes
Natural Gas	U.G.I. Reforming Process

UNITED ENGINEERS & CONSTRUCTORS INC

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WITH A BACKGROUND OF OVER SIXTY YEARS' EXPERIENCE

D. J. Atwell Is Metropolitan Manager for Dresser

Daniel J. Atwell

Appointment of Daniel J. Atwell as metropolitan district manager of the Dresser Manufacturing Division, has been announced by H. Z. Hight, sales manager.

In line with established policy, Mr. Atwell will work closely with such large metropolitan utilities as Consolidated Edison Co., The Brooklyn Union Gas Co., Brooklyn Borough Gas Co., Kings County Lighting Co., Long Island Lighting Co. and Westchester Lighting Co.

Outside of New York, Mr. Atwell will work with Public Service Co. of New Jersey, Jersey Central Power & Light Co., Philadelphia Electric Co., Philadelphia Gas Works Co. and Delaware Power & Light Co.

Mr. Atwell joined Dresser early in 1946. Since then he has worked with gas and water utilities throughout the New England area, Eastern New York State and New Jersey.

Rochester G & E Promotes East and McCumber

Two promotions among executives of the Rochester Gas & Electric Corp., Rochester, N. Y., have been announced by President Alexander M. Beebee.

Leo East, who has been general superintendent of gas operations, has been made general manager of gas and engineering operations, his department now including engineering and purchasing. Mr. East recently celebrated his 25th anniversary with the R G & E.

Ralph McCumber, who has been general superintendent of the electric department, becomes general manager of all electric and steam operations.

Both Mr. McCumber and Mr. East have been appointed to the management council of the company, the other members of which are company officers. The management council plans and directs the operations of the company.

Fourth Rate Cut In '49 Made By Portland, Ore., Company

A reduction in consumer costs of $652,000 on an annual basis will result from new rates of Portland Gas & Coke Co., as announced recently by George H. Flagg, Oregon public utilities commissioner.

It is the fourth cut in rates made by the company since the first of the year and brings to nearly $2,000,000 the total of the four reductions on an annual basis, Mr. Flagg pointed out in making the announcement.

All of the reductions have been the result of decreasing costs of heavy fuel oil. The present rates place residential use, exclusive of space heating, on approximately pre-war level, he noted.

Space heating, which received the greater percentage increase, will be reduced slightly more than 20 per cent from now on.

Texas Eastern Completes Ohio Construction

Texas Eastern Transmission Corp. has substantially completed all construction work in Ohio necessary to make deliveries this winter under its expansion program designed to raise the capacity of its Inch lines ultimately to 740,000,000 cu. ft. a day

Fifty-five miles of pipe are still to be laid next spring to complete the Ohio construction, the company announced recently, but the 122.5 miles now in the ground, together with additional compressor station facilities installed, will provide enough capacity to handle all quantities of gas to be received this winter from Texas Gas Transmission Corporation's new Texas-to-Ohio pipe line now under construction.

The additional gas will be delivered to subsidiaries of Consolidated Natural Gas Corp. and Columbia Gas System and to other utility companies, Texas Eastern stated.

As part of the same construction program, work has been started in Louisiana on one section of 20-inch line that loops the company's Little Big Inch from Station E near Castor, La., northward to a point of connection with the Texas Gas line near Lisbon, La. This supply construction should be completed by the end of the year, the company announced.

Other parts of the program have been scheduled for construction next year, including another section of 20-inch "loop" in Texas and 100 miles of 16-inch line from the Provident City field in Lavaca County, Texas, to the Baytown, Texas, terminus of the Little Big Inch, Texas Eastern reported.

By the end of the year all construction necessary to make deliveries to Texas Gas at the supply connection at Lisbon, La., will be completed, the company stated.

Central and N. Y. Power Ask to Build Natural Gas Line

Central New York Power Corp. and New York Power and Light Corp. have filed a joint application with the Federal Power Commission seeking authorization to construct and operate pipe line facilities which would carry approximately 4,100,000 cu. ft. of natural gas per day for distribution in Oswego, Onondago, Madison, Oneida and Herkimer counties in New York.

Estimated over-all capital cost of the proposed project is $972,000. Both companies are wholly-owned subsidiaries of Niagara Hudson.

Central is proposing to construct a 16-mile pipe line to receive the additional 4,100,000 cu. ft. of gas from its present supplier, New York State Natural Gas Corp. The line would connect with New York State's system on the Otisco-Onondago town line in New York State and extend north and east to a connection with Central's existing system near Syracuse.

The application says the natural gas transported over the proposed line would be used for (1) distribution in that portion of Central's Utica division lying between its Syracuse-Oswego division and the Oneida district of New York Power; (2) resale to New York Power's Oneida district in Oneida and Madison Counties; and (3) a reforming and enriching agent in Central's gas manufacturing operations in its Utica division.

Changes Made By Pittsburgh Protective Coatings

Benjamin H. Means

Benjamin H. Means has been made national service manager of the Protective Coatings Division of the Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., Mr. Means most recently handled sales for the S. D. Day Co., of Houston. Prior to joining the Pittsburgh firm, he had been associated with the Barrett Co. and more recently with Associated Contractors & Engineers, of Houston.

The Protective Coatings Division has opened a new office at Tulsa to serve the central midwest. Frank E. McNulty, former manager of the Koppers Company's Tulsa office, has joined the Protective Coatings staff as manager of the new office.

Appointment of the S. D. Day Co. as southwest representative for Protective Coatings has been announced by Robert M. Moore, sales manager of Pittsburgh Coke & Chemical.

S. D. Day, head of the sales firm, has handled work for the United Gas Pipe Line Co. in Texas, and sold all the enamel for the Southern Counties Gas Co.'s line from Huntington Beach, Cal., to San Diego. He also handled a large share of the coatings sold to War Emergency Pipe Line, Inc., for the Big Inch and little Big Inch lines.

Mr. Day was formerly with the Barrett Co. and then was vice-president in charge of Southern sales for the Pipe Line Service Corp. He started his own company in 1949.

Review of Business Research in Universities

A review of current business and economic research being carried on in American colleges and universities is contained in a publication issued in August by the U. S. Department of Commerce.

It is especially designed for use by businessmen and business consultants who need to be informed concerning research being conducted at universities throughout the country. Research workers in business and economics use it to coordinate their work.

The volume lists 1,188 research projects in schools of business and departments of economics in 105 colleges and universities. In addition to author data and information on project status there is, in most instances, a brief description of the project including a statement of objectives and method of procedure.

The projects listed cover 24 subject fields, including Government-business relations, labor relations, management, marketing, accounting, statistics, finance, public finance, and international trade.

"*Survey of University Business and Economic Research Projects, 1947-48*" may be obtained from the Superintendent of Documents, Washington 25, D. C. or from any Department of Commerce Field Office for $1 each.

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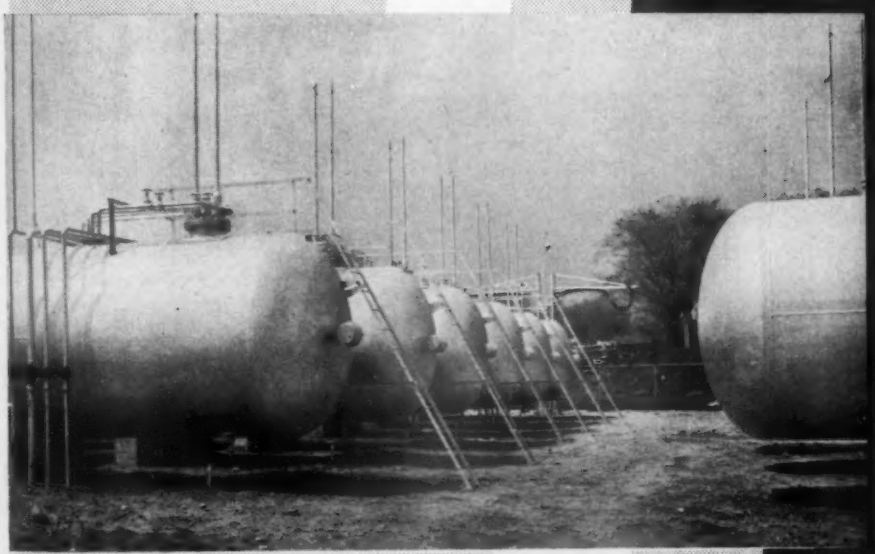

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$2,000,000 of American Equipment Going to Italy for Rebuilding and Expanding Gas Plants

Virgil Stark

North American Utility & Construction Corp. has recently signed contracts in Italy for approximately two million dollars worth of American equipment for the Italian gas industry.

The equipment will be purchased under Economic Cooperation Administration loan credits allowed to Italy. Based on this loan the Italian Government Agency I.M.I. (Instituto Mobiliare Italiano) extends credits to the Italian industry payable in 15 years at 5½ per cent.

The contracts include machinery for rebuilding and extension of the gas plants in Milano, Rome, Torino, Florence, San Remo and Ferrara. Also included are gas generator sets which will reform natural gas and propane.

One plant, in San Remo, using the Girdler process, is for the catalytic reforming of either propane or natural gas to produce a low heat content gas of 320 Btu which will be enriched by Cutler-Hammer equipment with propane to 480 Btu and a gravity of approximately 0.48 obtaining a gas equivalent to manufactured gas. This plant will be the first one of its kind in Europe.

Another plant for Milano will consist of a Semet-Solvay reverse flow carburetted water gas set with provisions for reforming natural gas through the coke bed. This gas generator will utilize different fuels, such as coal, coke, gas oil or heavy oil for making gas. As the price and availability of fuels vary widely in Italy, the gas plant will interchange fuels, using the ones most economical at any time. Coke, for instance, is at certain times in large demand and at other times has so little market as to create storage and cash immobilization problems. Heavy fuel oil is not used at present in Italian plants and is available from Italian refineries at low cost.

Increase Capacity 75 Per Cent

The generator set for Milano will have its normal capacity of 3.7 Mcf daily increased by 75 per cent to 6.5 Mcf when natural gas is reformed. The generator will have the most modern devices such as mechanical grate, water jacket cooling, automatic coal charging and waste heat boiler. The natural gas will be reformed in this set to reduce its heat content from 1,000 Btu and 0.65 gravity to approximately 425 Btu and 0.4 gravity. It will thereafter be enriched with natural gas by Cutler-Hammer automatic equipment to the same heat content as the manufactured gas.

The contract includes 16 compressors and exhausters for a total capacity of 8,000 hp of which four units of 800 hp each are for Milano; four units each, 600 to 700 hp, for Rome; other units of 200 hp and 350 hp each are for Torino and Florence. There are approximately 5,500 hp in electric motors, 2,000 hp in different steam turbines, and one 500 hp Clark Brothers gas engine. All the compressors will be Roots Connersville. The exhausters will be Roots Connersville and Spencer Turbine.

The supply will also include 10 Cottrell electric tar precipitators and coal-dust precipitators of the Research Corp., for a total capacity of approximately 80 million cu. ft. per day. The contract also includes seven Hydroscavengers built by Whittington Pump for purging the distribution lines, some provided with hot drip oil and vacuum provisions. Cutler-Hammer equipment will be supplied to maintain constant the heat content of the sendout gas. There are several calorimeters for recording the heat content. Measuring and control apparatus will be supplied by Rockwell International Corp.

The orders were obtained from two of the most important gas companies in Italy—Italgas and Edison—by Virgil Stark, President of North American Utility and Construction Corp., as the result of a personal survey of Italian gas plant requirements and possibilities. Through this contract the gas industry in Italy will acquire and get acquainted with American equipment and be able to produce a better and cheaper gas.

All these projects were made possible through the financial help of ECA, and all machinery shipped will carry the emblem and ECA marks. American engineers will be sent to Italy to supervise the erection, make tests and start operations.

'No Accident' Month Racked Up by Pittsburgh Companies

Manufacturers Light and Heat Co. employes closed the August "No Accident" safety campaign with a perfect safety record. There was not a single injury during the month to cause time lost from work.

Irving K. Peck, vice-president and general manager, reported that this same record was accomplished throughout the other six associated gas companies making up the Pittsburgh group of the Columbia Gas system.

Approximately 2975 men and women in the seven gas companies worked safely for 501,110 hours during the drive.

Mr. Peck also announced that 672 cars and trucks owned by Pittsburgh group gas companies were operated 704,213 miles with only four minor accidents that caused any damage to automotive equipment.

John F. Mooney Is Dead

John F. Mooney, 53, died suddenly at his home in Orlando, Florida, on Aug. 8. Mr. Mooney was for many years an expert on heavy duty gas cooking equipment.

He was a director of the Florida-Georgia Gas Meters Association, and was credited with having instituted the "Friendship Room" at meetings of this association as well as the Southern Gas Association.

Colorado Interstate Gets Approval from FPC

Colorado Interstate Gas Co. of Colorado Springs, has received Federal Power Commission authorization to construct additional facilities designed to increase the daily sales capacity of the company's natural gas transmission system by 62,000,000 cu. ft. per day. Estimated cost of the project is $4,328,930.

The expansion program involves an increase to 181,000,000 cu. ft. in the daily capacity of the company's pipe line connecting the Hugoton Field, Kansas and Denver. The program includes construction of 38 miles of 20-inch main line loop on the Hugoton pipe line in the vicinity of Denver; installation of three 1,200-horsepower compressor units at the Lakin station at the Hugoton Field; and construction of a new 8,400-horsepower compressor station on the Hugoton pipe line near the town of Kit Carson, Colorado.

Colorado Interstate's customers in Colorado include: Colorado Springs Department of Public Utilities, Public Service Co. of Colorado, the Pueblo Gas and Fuel Co., Canon Gas Service Co., Limon Natural Gas Co. and Colorado-Wyoming Gas Co.

Research Corp. Gives License to Niagara Blower Co.

J. W. Barker, President of Research Corp., has announced that the Niagara Blower Co. has been awarded the license to manufacture dehumidifying and air conditioning equipment under its series of patents covering the removal of moisture from air or other gases by the use of a hygroscopic liquid.

In the method developed by the corporation's scientists, air is dehumidified by contact with a liquid spray which absorbs the moisture from the air stream passing through the equipment. The dehumidifying liquid, as it is diluted by the airborne moisture, is automatically re-concentrated in apparatus which evaporates the moisture and discharges it outdoors.

This provides a continuous process which promises much improvement in the making and handling of many products and materials that pick up unwanted moisture. Many prepared foods, such as candy and powdered coffee, drugs and antibiotics, such as penicillin; paper, textiles, synthetic materials and chemicals are of this nature. There are also applications to industrial drying and process air conditioning, and in preventing moisture damage to electrical and metal products. Comfort air conditioning also is likely to be improved and made lower in cost by this new method.

Research Corp. is a foundation whose net earnings, from licensing activities and sale of Cottrell precipitators, are contributed to scientific and technical institutions and societies for the support of technical and scientific investigation and research.

Niagara Blower Co. has been engaged in the manufacture of air engineering equipment since 1919. New equipment to make the liquid absorbent dehumidifying method commercially available is now being designed. Offices are located in the Chrysler Building, New York 17, N. Y., and its plant at Buffalo, N. Y.

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CYCLONE

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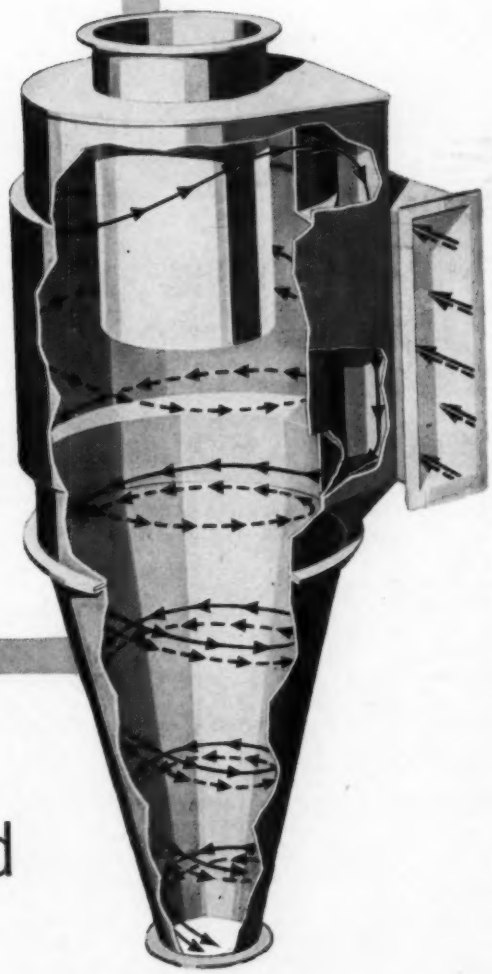

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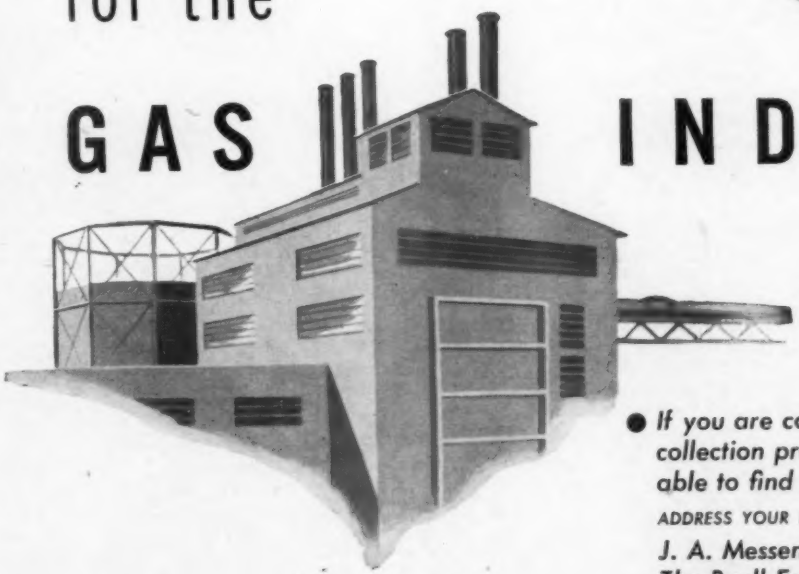

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INGAA Announces Program for Dallas Meeting

Many phases of the natural gas industry's activities will be covered in papers at the annual meeting of the Independent Natural Gas Association of America, to be held at the Baker Hotel, Dallas, on October 31.

Following an address of welcome by the mayor of Dallas, and the report of INGAA President A. B. Harper of Fort Smith, Ark., President of the Arkansas-Oklahoma Natural Gas Co., there will be discussions concerning winter supply problems, with S. B. Irelan, of Oklahoma City, President of the Cities Service Gas Co., talking on "Winter Supply Problems of Transporters," and G. A. Staples, Corpus Christi, of The Chicago Corp., offering a paper on "Winter Supply Problems of Producers and Gatherers."

After hearing from Rex Baker, Houston, of Humble Oil & Refining Co. on "Legal Problems for the Natural Gas Industry," the morning session will close with a motion picture showing the activities of the Oklahoma Natural Gas Co.

Wesley E. Disney, of Tulsa and Washington, who is INGAA counsel, will speak on "A Look into the Legislative Future."

B. A. Hardy, independent operator of Shreveport, will discuss the "Status and Prospects of Natural Gas from Tidelands," and he will be followed by Dr. Frank H. Dotterweich, of the Texas College of Arts and Industries, on "The Competitive Position of Natural Gas Versus Coal, Fuel Oil, Manufactured Gas and Atomic Energy."

Charles C. Wine, of the Arkansas Public Service Commission, will talk on "Overlapping Problems of State and Federal Regulation," and then there will be a round-table discussion on "Methods and Laws Relating to Gas Measurements," with the following attorneys participating: Scott Hughes, of Southern Union Gas Co., Dallas; R. E. McCracken, of Cities Service Gas Co., Oklahoma City, and Marshall Newcomb, of Lone Star Gas Co., Dallas.

FPC Approves Expansion of Southern Natural

The Federal Power Commission has authorized Southern Natural Gas Co., of Birmingham, to construct natural gas transmission facilities designed to increase the capacity of its branch lines in Alabama and Mississippi and to supply natural gas service to a cement company in Alabama. Estimated cost of the project is $1,226,070.

As authorized by FPC, the company will build approximately 38.1 miles of branch loop lines, submarine crossings of the Warrior and Chattahoochee rivers, and a 7.4 mile extension of a branch line to provide service to the Southern Cement plant.

Construction of 31.3 miles of branch loop lines and the crossing of the Warrior River is designed to increase capacity of the company's Montgomery branch line in Alabama from 76,300,000 to 87,300,000 cu. ft. daily. The remaining 6.8 miles of looping, to be constructed in Mississippi, will increase capacity of Southern Natural's Meridian branch line from 12,000,000 to 13,000,000 cu. ft. a day.

Southern Union Takes Over Albuquerque Distribution

Albuquerque, New Mexico, became a part of the Southern Union Gas Co. distribution system on Sept. 30, when Southern Union began serving natural gas directly to 24,000 customers there following the gas company's purchase of the natural gas distribution facilities in Albuquerque from Public Service Co. of New Mexico.

C. H. Zachry

Necessary approval of the transaction by the New Mexico Public Service Commission was given September 27, making possible the completion of the transaction, which involved approximately $4,000,000.

Significance of the transaction, according to C. H. Zachry, Dallas, Southern Union President, is that Southern Union is now distributing gas directly, rather than indirectly, to Albuquerque. Since 1930 Southern Union has owned the gas distribution franchise in Albuquerque but had assigned the franchise and delivered gas to Public Service for distribution in Albuquerque.

Southern Union also acquired in the transaction the gas department employees of Public Service, Mr. Zachry said.

Many Utility Men Are Active in Controllers Groups

Charles L. Carr, assistant controller of the Potomac Electric Power Co., Washington, D. C., has been elected President of the District of Columbia Control of the Controllers Institute of America. A. E. Elliott, treasurer of the Louisiana Power & Light Co., has been similarly honored by the members of the organization's New Orleans Control. C. P. Van Dyke, controller of the Iowa-Illinois Gas & Electric Co., Rock Island, Ill., has been reelected President of the Quad Cities Control of the Institute.

At the annual meeting of the Houston Control, Ronald L. McVey, controller of the Tennessee Gas Transmission Co., was elected President and John B. Cookenboo, controller of the Houston Natural Gas Corp., was chosen vice-president.

The new vice-president of the New York City Control is H. H. Scaff, vice-president of Ebasco Services, Inc. Clarence C. Hermann, controller of the Southwestern Gas & Electric Co., Shreveport, La., has been named a vice-president of the Institute's Dallas Control.

In Kansas City, Ralph O. Linville, controller of the Kansas City Power & Light Co., has been named secretary of the local controllers' organization, and Norman F. Paxton, assistant secretary and assistant controller of the Panhandle Eastern Pipe Line Co., has been chosen treasurer. Herbert S. Howard, assistant controller of the Niagara Hudson Power Corp., has been renamed secretary and treasurer of the Syracuse Control.

T. V. Colley, comptroller of The Dayton Power & Light Co., is the new treasurer of the Institute's branch in Dayton.

Edgar R. Crofts, of Rochester, Is Dead

Edgar R. Crofts, 61, operating vice-president and a director of Rochester Gas and Electric Corp. and associated with that utility for more than 33 years, died on September 9.

Graduated from Cornell in 1910, Mr. Crofts was employed for several years in New York City in construction work. In 1916 he came to Rochester Gas & Electric as a design engineer in maintenance. Posts as purchasing agent, chief engineer, etc., followed. In 1944 he was made a vice-president and in 1946 was placed in charge of all electric, gas and steam operations of the company.

Convert Catalytic Plants to Base Load Operation

Three catalytic cracking plants built for the UGI system in Pennsylvania by Surface Combustion Corp., Toledo, as peak load shaving plants are being converted for service this winter as base load plants.

The plants at Harrisburg and Reading were originally constructed to employ a variety of feedstocks including butane, propane, straight run gasoline and casing head gasoline with provision being made for their eventual conversion to natural gas. These plants were completed in time to meet the peak load requirements for the winter of 1948-49. The Allentown plant has just been completed and is scheduled for immediate adaptation to natural gas base load operation.

With the advent of natural gas to the Harrisburg-Allentown-Reading area, the three local gas utilities have decided to employ their three catalytic cracking plants in these locations for the conversion of natural gas to coke oven gas replacement as a base load operation. These utilities are the Consumer's Gas Co., Reading; the Harrisburg Gas Co., Harrisburg; and the Allentown-Bethlehem Gas Co., Allentown.

Surface Combustion has been engaged to effect the conversion. The reformed gas will be interchangeable with the oven gas regularly supplied by the utilities.

Conversion of the three plants will be completed by Dec. 1.

Mid-West Gas Ass'n. School Attracts Big Attendance

The twenty-sixth mid-west gas school and conference was held Sept. 6 and 7 at Iowa State College, Ames, under joint auspices of the Mid-West Gas Association and Iowa State College. There was a record registration of 239.

A special feature was a serviceman's school of the Servel air conditioner, staged by the Servel Co. Forty servicemen completed the two-day course.

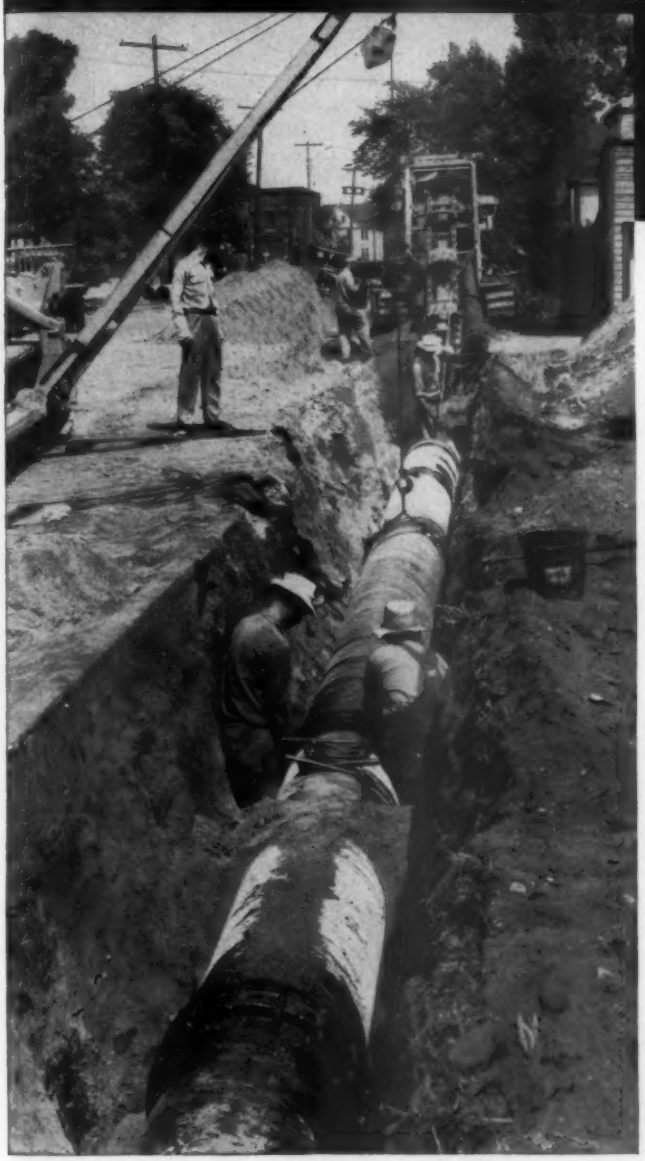
An inspection trip, at which members of the association were guests of the Fisher Regulator Co., for a tour through the company's manufacturing plant and luncheon, followed the convention program on September 8.

The regular conference program covered vital subjects in utility operation, distribution, utilization, production and metering.

In Minneapolis . . .

647,656 feet of Dresser-Coupled steel mains

3″ thru 30″



Since changing over to natural gas, The Minneapolis Gas Co. has laid almost 123 miles of steel mains in sizes 3″ to 30″.

Dresser Couplings were used on all lines.

In its aggressive policy of bringing the benefits of gas to more people, this utility was quick to discover that Dresser Couplings make for speedy and economical pipe laying, and keep maintenance costs at a minimum.

When you use Dresser Couplings, pipe joining can keep right on the heels of the ditcher, and backfilling can follow immediately. No long traffic tie-ups, no stalling around because of weather.

And with Dressers, you get uniform joints that stay "Flexible-Tight"—permanently—even under the pounding of downtown traffic.

For complete information and expert follow-through, consult your Dresser Sales Engineer or write to our Bradford, Pa. headquarters.

DRESSER "FLEXIBLE-TIGHT" **COUPLINGS**

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries) • In Texas: 1121 Rothwell St., Houston
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A. O. Smith to Build Texas Pipe Mill

These presses in the Milwaukee plant of A. O. Smith Corp. make a tube out of flat skelp in three steps. From right to left: U-ing, crimping, and closing.

A NEW pipe mill to cost in excess of $5,000,000, and with a capacity of up to 35,000 tons of pipe per month, in sizes from 8⅝ inches up to 30 inches, and larger if required, is to be built at Houston by A. O. Smith Corp. of Texas. Construction will start soon, and it is expected that the mill will be in operation by the summer of 1950. The plant will be the second largest mill in the country for the production of welded pipe, being exceeded in size only by the one operated by Smith in Milwaukee.

W. C. Heath, President of the A. O. Smith Corp. announced the plans at a breakfast in the Houston Club, September 23, attended by over a hundred civic and industrial leaders of Texas and the mid-continent. Officers of the new company will include: L. B. Smith, President; D. F. McCarthy, vice-president and general manager; John M. Floyd, vice-president; and M. J. Vollmer, secretary and treasurer. The board of directors will be composed of officers of the Smith company, and of the Sheffield Steel Corporation.

The Texas corporation is a separate company with the capital stock being held equally by A. O. Smith Corp. and the Sheffield Steel Corp., which in turn is a subsidiary of Armco Steel Corp., Middletown, Ohio.

Sheffield Steel has the only plant for the production of open hearth steel in the state of Texas. Constructed in 1941, and expanded in stages to three and one-half times its original size, the Sheffield plant at one time furnished vast quantities of steel for shipbuilding and other armament requirements.

Since the war it has supplied steels of various kinds regularly to the A. O. Smith Corp. at its Houston works for the manufacture of pressure vessels, LP gas tanks and vertical turbine pumps. During the period when steel for pipe making was in critical supply, Sheffield shipped 100,000 tons of skelp to Smith's Milwaukee plant for fabrication into pipe. Company officials estimate that to supply the requirements of the new Smith operation at Houston, Sheffield will have to bring in over a thousand carloads of raw material per month.

One of the automatic machines designed by Smith engineers for flash welding a 40-foot length of pipe in a single operation.

Houston was selected as a site for the new pipe mill because of its location close to this dependable source of steel and because it is strategically situated with respect to the southern end of major oil and gas pipe lines now being laid, or proposed for early future construction. Smith has announced that pipe orders on the books are already scheduled for fabrication in the Houston mill. It is anticipated that the expanded operations brought about by the new Smith activity, and by the increased output from Sheffield will add more than a thousand new jobs to the payroll of the Texas city.

The new plant will in no way affect the present operations of A. O. Smith Corp. in Texas, the parent company has announced. The company maintains a district administrative office in Houston that is responsible for the sale of all Smith products in eight Southwestern states. These products include pipe, casing, pressure vessels, glass lined tanks and railroad equipment. It is one of the nation's largest makers of automobile frames. For the consumer field it manufactures domestic and commercial water heaters, house heating boilers and a new fused-glass lined farm crop storage unit.

G. R. Steere Is Sales Engineer with Semet-Solvay

George R. Steere has been appointed a sales engineer by Semet-Solvay Engineering Division, Allied Chemical & Dye Corp., New York. He will serve principally in the New England territory, and will aid in the promotion of Semet-Solvay regenerative reverse flow oil gas process.

Mr. Steere is well known in the gas industry, having spent 25 years in development and sales of Semet-Solvay equipment. He has also served as a consulting engineer to the industry.

LP Ass'n Chooses Kreutzer Managing Director

Arthur C. Kreutzer has been made managing director of the Liquefied Petroleum Gas Association, according to an announcement by Si G. Darling, President. He will assume the duties of Howard D. White, executive vice-president, who has resigned effective Oct. 31 to become associated with the newly organized Perlite Development Corp., Albuquerque, N. M., as an owner and officer.

Mr. Kreutzer has been counsel and secretary of the association since 1946.

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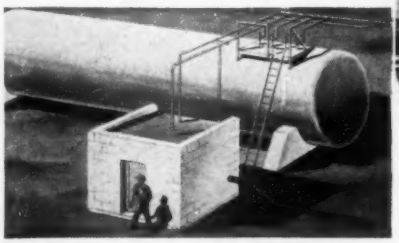
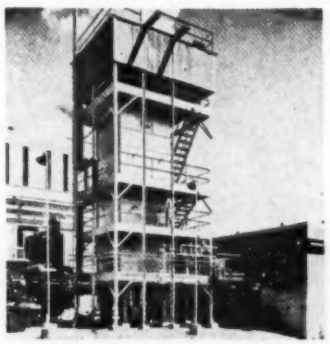


Propane-Air

MODERNIZATION

Catalytical Reforming
Modern Generators
Propane for Peak Loads



• NATURAL GAS CHANGEOVERS •

PRESENT — WE ARE COMPLETING:

Carburetted Water Gas Plant with Reforming of Natural Gas
Propane Catalytical Reforming Plant
Propane Enriching Plants
Propane Air Plants
Propane Storage, Vaporizing, Unloading Plants
16 Compressor Units for a Total of 8,000 HP
4 Steam Turbine Units for a Total of 2,000 HP
10 Electric Tar Precipitators Totaling 80,000,000 CFD
7 Hydroscavenger Units
3 Gas Utilities Operated by Our Subsidiaries
1 Bottle & Bulk Gas Distribution

PAST — WE HAVE COMPLETED:

20 Central Propane Storage and Distribution Systems (in 6 States, U. S. A.)
3 Propane-Air Changeovers of Gas Plants (in New England)
Equipment for Installation of Natural Gas Pipeline (500 Miles) (Argentina)
Propane Storage, Filling and Distribution (Brazil)
25,000 Appliances Installed
1,000,000 Feet of Pipe Installed
400,000 Gallons of Propane Storage Installed
10,000,000 Pounds per Year of Propane Distributed

Legal Decisions

(Continued from page 38)

mission under the Natural Gas Act.

The higher court held that notwithstanding the gas company may have preferred *not* to assume the burdens of a common carrier, for transportation of natural gas in interstate commerce through its pipe lines, yet *it is* a common carrier and within the jurisdiction of the Federal Power Commission. This court said:

"The petitioner, having applied for and accepted a permit to do so and having constructed its pipe line over the public lands, became and is a statutory common carrier of natural gas and that its rates and schedules are subject to the jurisdiction of the Federal Power Commission under the Natural Gas Act. . . . The duties of the petitioner (gas company) as a common carrier and the regulatory power of the Commission do not end at the boundaries of the public land traversed by the pipe lines. They apply alike to the entire interstate transportation of natural gas over every part of the interconnected pipe line system."

According to a recent higher court dependents of an employe will be awarded compensation based on death by carbon monoxide poisoning *if* the decedent's face had a cherry red hue.

For example, in Jeffersonville v. Rager, 65 N. E. (2d) 638, it was shown that an employe entered a room to test for leaks. A fellow workman called to the employe about 11:35 A.M. and received no answer. The employe's body was found at 12:45. He was lying flat on his back and had suffered very slight abrasions of his right cheek.

In view of this testimony the Industrial Board decided that the employe died from carbon monoxide poisoning and awarded the widow compensation under the State Workmen's Compensation Act. The higher court approved the award, and said:

"There is direct evidence of the presence in decedent's body and body reactions of a cherry red hue on the face, skin and internal organs which is characteristic of carbon monoxide poisoning."

Due to a Risk

Considerable discussion has arisen from time to time over the legal question: When does an injury arise out of and in the course of employment?

Reams have been written to define and apply the simple, expressive requirement that, in order to be entitled to compensation, an employe must have received "a personal injury by accident arising out of and in the course of his employment." The inescapable connotation of the phrase is that the injury must have been *due to a risk* to which the employe was exposed because of the employment. In other words, a court must be able to trace the resultant injury to a proximate cause set in motion by the employment, and not by some other agency, or there can be no recovery.

For example, in Hawkins v. Portland Gas Light Co., 43 Atl. (2d) 718, it was shown that an employe named Hawkins was killed while in the employ of the Portland company by a shot from a revolver in the hands of a crazed United States soldier. His daughter, a dependent, sought an award of compensation upon the ground that the injury causing the death of her father arose out of and in the course of his employment as a foreman.

The testimony proved facts, as follows: "Hawkins was on the shift from

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three to eleven o'clock in the evening. At seven-thirty, Hawkins, with two other employes, was in the front office of the plant. This plant was enclosed by a board fence with barbed wire strung on its top, and the gate was closed and locked. The three men heard a noise, and all three proceeded leisurely toward the gate, with no anxiety that the company's property was in any way endangered. Hawkins unlocked the gate, opened it, and someone shot him. In refusing to award compensation the higher court said:

"The evidence does not warrant a finding either that Mr. Hawkins was in the act of protecting his employer's property or that such property was in fact endangered, or even that Mr. Hawkins thought it was. He was not fired upon because he was an employe of the gas light company. . . . So far as appears in the evidence, Hawkins had no duty to perform when he went with the other men outside the place of his employment. It was not incumbent upon him at the time to unlock the gate separating the premises of his employer from the street and the railroad tracks."

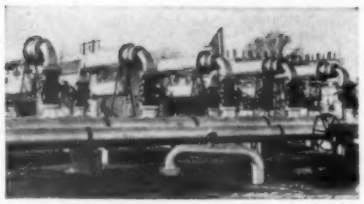
For other higher court decisions involving variations of the law on this subject, see McNiff v. Town of Orchard, 138 Me. 335, 25 A. (2d) 493; Robitaille's Case, 34 A. (2d) 473; Weymouth v. Burnham & Morrill Co., 1 A. (2d) 343; Westman, 106 A. 532; Fogg, 125 Me. 168; and Wheeler, 159 A. 331; Case, 222 Mass. 487, 495, 111 N. E. 379, 383, L.R.A.1916D, 1000.

Temporary Rates

According to a recent higher court the Public Service Commission may establish temporary rates during the period the court awaits an appeal as to the validity of rates previously established by the commission.

For illustration, in City of Cincinnati v. Public Utilities Commission, 80 N. E. (2d) 150, it was shown that the city council, by ordinance, established new and lower gas rates. The gas company was dissatisfied with and unwilling to accept such lower rates as prescribed by the ordinance, and filed an appeal from the rates so fixed with the Public Service Commission.

In subsequent litigation the higher court held that the Public Service Commission during the appeal had jurisdiction to establish and enforce interim rates to prevent injury to the public or utility, pending determination of such appeal.



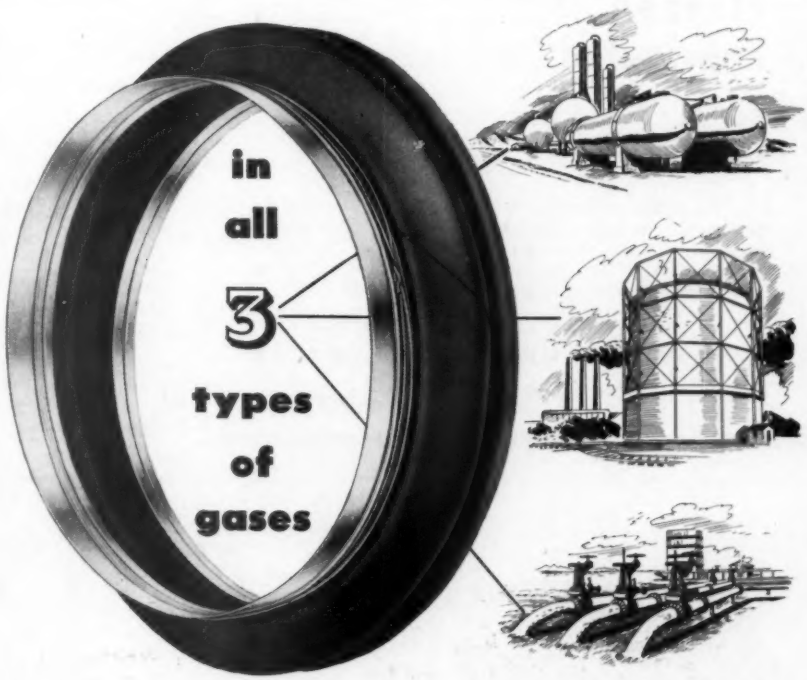
Aerotec Announces Dry Gas Scrubbing Method

A gas scrubber based on centrifugal precipitation of solids and liquids has been announced by The Aerotec Corp., Greenwich, Conn.

Average efficiencies of 99.6 per cent are claimed on typical pipe line dust. On the "Big Inch" pipe line, standard 100,000,000 scfd units were manifolded to give a total capacity of 500,000,000 scfd at some compressor stations.

The scrubbers are available in a variety of sizes up to 100,000,000 scfd. The vertical design scrubbers are used where either liquids or solids are to be removed from gas. Horizontal units, illustrated here, are used primarily to remove liquids such as water and distillates.

Requests for information should be sent to The Thermix Corp., Greenwich, Conn., project and sales engineers for Aerotec.



Vulcan Diaphragms Excel!

Whether the gas is manufactured, natural or L.P., VULCAN Diaphragms for meters and regulators give outstanding performance.

The VULCAN Molded Loop is streamlined, smooth and perfectly balanced, free from irregularities of shape. Because of vulcanizing to the rings, plus fastening with special wire, tie leaks are virtually impossible.

VULCAN Diaphragms remain pliant and flexible, with no need for oiling. They do not dry out and become brittle, and successfully withstand the drying effects of both natural and L.P. gases.

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NORWALK VALVE COMPANY
South Norwalk, Conn.

FPC Reports Increase in Revenues For Natural Gas Companies

Operating revenues of natural gas companies reporting to the Federal Power Commission totaled $61,325,709 in July, an increase of 8.9 per cent over the $56,309,247 reported for the same month a year ago.

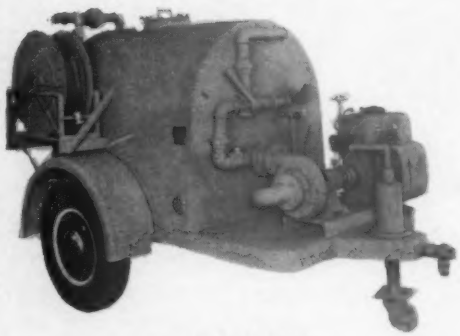
Gas utility operating income for July, 1949, amounted to $5,518,822, down 20 per cent from the $6,898,093 reported for July, 1948. Net income for the month was $5,299,423 compared to $7,419,964 for July, 1948.

Gas operating revenue deductions amounted to $55,815,320, an increase of 12.9 per cent. Of this total, operating expenses accounted for $43,298,852, up 18.5 per cent; depreciation for $6,915,698, a gain of 9.2 per cent; and taxes for $5,600,770, a decrease of 14.6 per cent.

Gas sales to ultimate consumers in July, 1949, were 109,418,000,000 cu. ft., an increase of 3.2 per cent over July, 1948. Sales to residential consumers decreased 0.5 per cent while sales to commercial and industrial consumers increased two per cent and 3.3 per cent, respectively. Revenues from sales to ultimate consumers increased 3.6 per cent and amounted to $27,862,568. Revenues from the three classes of service, residential, commercial and industrial, increased 1.4 per cent, 2.9 per cent, and 5.2 per cent, respectively.

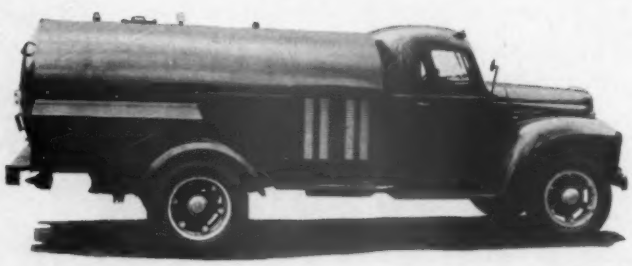
For the 12 months ended July 31, 1949, gas operating revenues aggregated $946,785,188, an increase of 16.1 per cent over the total of $815,665,324 reported for the 12 months ended July 31, 1948. Net income for the period amounted to $165,259,763, compared to $151,230,588 for the previous 12 months, or an increase of 9.3 per cent.

Net gas utility plant of the reporting companies aggregated $2,302,403,503 on July 31, 1949, compared to the $1,961,323,216 reported a year earlier.



TRAILER MODEL

TRUCK MODEL



CLEAN DRIPS FASTER

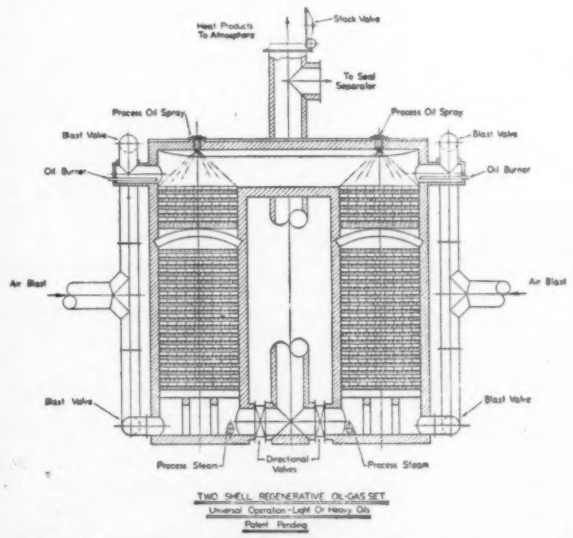
With a Whittington Hydro-Scavenger, you can remove condensate from drips and open clogged service leads in less time . . . and with less manpower. The Hydro-Scavenger cleans drips up to 30 feet deep . . . loads and unloads at a rate up to 100 gallons a minute! Requires only one man to operate. It creates 27" Hg. vacuum for loading; 20 pounds pneumatic pressure for unloading — to overhead tank, if desired. Simple design and rugged construction assure years of trouble-free operation without loss of vacuum or pressure. Material handled does not pass through the pump to cause clogging or wear. Available in truck, trailer and skid models, powered by two-cylinder gasoline engine. Truck model also available with power take-off drive. Collection capacities from 50 to 1,000 gallons. Write today for Bulletin HS-49 and for list of utility users. Whittington Pump & Engineering Corp., 1126 Prospect Street, Indianapolis 3, Ind.

WHITTINGTON

New Oil Gas Equipment Being Installed at Cambridge

THE Cambridge Gas Light Co., of Cambridge, Mass., is making extensive additions to its oil gas generating plant, according to information released by Gordon C. Howie, vice-president and general manager of the company.

For the past two years, the Cambridge company has been distributing a high Btu oil gas of approximately 951 Btu. This gas replaced the former carburetted water gas with plant appliance conversions being effected in 1947. The existing water gas sets at that time were remodeled by The Gas Machinery Co. of Cleveland, to manufacture straight oil gas by a process which that company had recently developed.



This is a diagrammatic illustration of the apparatus at Cambridge

In 1949 the increasing availability and low cost of heavy, high-carbon oils made it desirable to remodel the existing equipment or install new gas generating equipment to utilize these heavy oils. The Cambridge company decided to rebuild one of the existing oil gas sets and also to construct a set of new design. This construction work is now in progress and is being carried out by Gas Machinery.

The set which is being remodeled will be of four-shell construction closely comparable to the four-shell arrangement used for testing heavy oils in the AGA program at Baltimore. The new oil gas set is a two-shell design employing fully regenerative principles.

Construction of both the four-shell and two-shell sets should be completed for start of operations this fall. Arrangements have already been made for supply, storage, and handling of the low-cost heavy oil.

It is estimated that the cost of the current improvement program will be somewhat in excess of $350,000, which includes building changes.

Plan to Use Aluminum for Pipe Line

A proposal to substitute aluminum alloy pipe for steel pipe for the transmission of natural gas has been submitted to the Federal Power Commission. Alabama-Tennessee Natural Gas Co., of Florence, Alabama, has asked for authorization to make the substitution on a 9,500 ft. section of lateral line previously authorized.

The company said the aluminum alloy pipe will have the same diameter and carrying capacity as steel pipe.

METAL RIM
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Sprague I-A	Ironclad No. I
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Reasons Why —

METAL RIM DIAPHRAGMS
Measure Gas Accurately:—

- **NO WETTING—**
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Plus—

1.—The fact the leather is entirely insulated away from and inside the meter case.

2.—Our LMPCO oil formula stays in the leather easily thru a 10-year period.

3.—We use only the finest leather obtainable for gas meter diaphragms—rechrome lamb skins.

YOUR GAIN—

Much longer life diaphragms,
Lower meter repair costs,
More accurate gas measurement.

Our 25-years experience manufacturing Metal Rim Diaphragms is your guarantee.

LANCASTER METER PARTS CO.
Post Office Box 378 Lancaster, Ohio

Unaccounted-for Gas

(Continued from page 21)

section of pipe, the rest of the pipe is likely bad also. It is therefore not economical to place a leak clamp or so on a line that is generally bad. It is more economical from every angle to replace the section of pipe and thus save the gas lost from new leaks that develop soon after the first are repaired.

Quite some thought should be given to the pipe used for replacement of worn out steel mains or services. Many companies are finding that mill wrapped pipe is more economical when replacing old lines or installing new extensions. The small percentage increase in the total *installed* cost of the main or service makes it more than worthwhile when viewed in the light of the life of the coated line as compared with the unprotected line.

Slow Meters. Quite often we hear of a property having a problem with "slow" meters after converting to a dry gas such as LP-gas or natural gas. While this is a fact with some properties, it is not the general rule by any means. If the property has maintained the meters in proper condition previously, there should be no appreciable trouble after conversion.

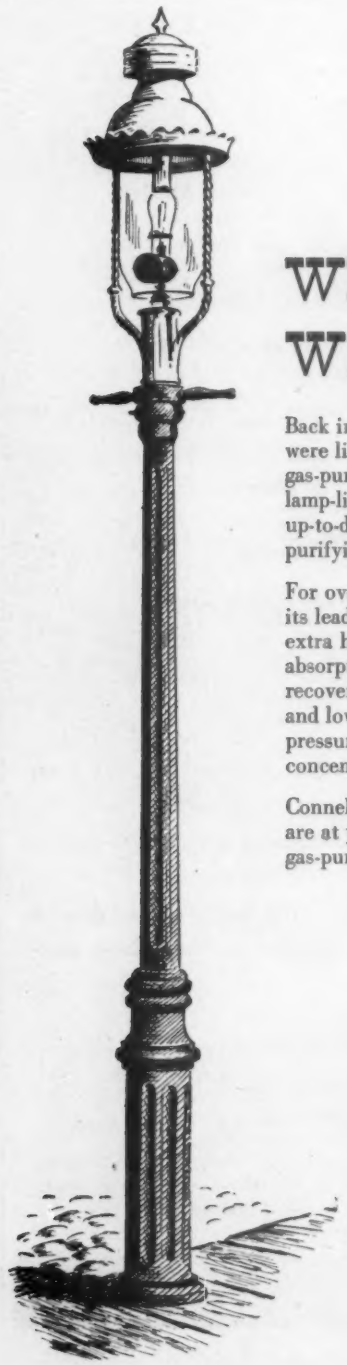
It is not unusual at all to find meters over 25 years old and even to find large numbers of meters that have been in service for as long as 20 years without even a test. Under such conditions, and where improper purification of the manufactured gas has been in evidence, it is likely the meter diaphragm is badly coated with tars and gums and these will cause trouble after conversion to any dry gas due to hardening of the diaphragm and eventual cracking.

The best policy, with any gas, is to keep up the meter test cycle and then there will be little if any trouble from "slow" meters.

One trouble that has been very prominent with small companies is that the old station meter has been incorrect due to slippage and gave a false light on the unaccounted-for. After conversion a new meter is often installed and this immediately registers the correct send-out which reflects an increase in unaccounted-for even though there was actually no increase at all.

Conclusion

1. Many companies have an acute unaccounted-for problem which is too often being overlooked.
2. The unaccounted-for problem is generally not more serious with LP-gas than manufactured gas, but is a general problem of many systems.
3. Soil and vegetation surveys, as well as other methods of leak detection are dependable when conducted properly and need not be expensive.
4. Some general methods are suggested for overcoming the unaccounted-for problem by treatment of the system or by repair and replacement of worn out sections.



WHEN GAS LAMPS WERE MODERN . . .

Back in the "good old days," when lamps were lit with gas, Iron Sponge was the *modern* gas-purification material. Today, the old lamp-lighter is gone, but Iron Sponge is still up-to-date—still the most efficient and economical purifying medium obtainable.

For over 74 years, Iron Sponge has retained its leadership because of these advantages . . . extra high activity and capacity, maximum absorption, longer periods between necessary recoverings, fast comeback, low initial cost, and low maintenance costs, ideal for high or low pressure purification and high or low H_2S concentration or mere traces.

Connelly's experience and engineering facilities are at your service. If your problem is gas-purification, consult Connelly.

Other Connelly products include:

CALOROPTIC
A simple, inexpensive instrument for continuous direct readings and BTU control applied to manufactured, natural, propane, and butane air gas.

SMYLY H2S TESTER
A patented device for quick, accurate tests using pre-treated paper discs.

CONNELLY pH TEST KIT
A complete simple outfit for making pH determinations. Includes universal indicator solution, test tubes, color chart and full directions. Handy 3" x 5" pocket carrying case.

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J. E. Stukel, Jr., Is Now with Youngstown Sheet & Tube

John E. Stukel, Jr., former assistant professor at Carnegie Institute of Technology, Pittsburgh, has joined the operating department of The Youngstown Sheet and Tube Company as a development engineer.

He is working at present in the office of Dr. Karl L. Fetters, special metallurgical engineer, in Youngstown.

GE Makes F. H. Gallup Head of Distributor Sales

Fred H. Gallup has been appointed manager of distributor sales of the automatic heating division of the General Electric Company's air conditioning department, it was announced recently by H. J. Wines, sales manager of the division.

Gasification Value

(Continued from page 31)

that the heat of combustion of the non-gaseous cracking products must be approximately equal to the difference between the heat of combustion and the enriching value (Btu recovery) of the feed oil was used in the derivation of the equation given below:

$$Wt_{\%} = 0.00699\ (Q - E) - 15.2 \quad \text{(Equ. 3)}$$

The average deviation of this equation is 3.2 weight per cent, based on the laboratory cracking test data and it is applicable within the limits outlined for enriching value correlation.

To simplify the use of these correlations a nomographic chart based on Equations 1, 2 and 3 was prepared (See Fig. 1). Plant application will be discussed in detail in Part II.

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Corporate Name Is Changed In Firm's Expansion

The directors of American Liquid Gas Incorporated, a Michigan corporation, have voted to change the company name to Trugas Constructors, Inc. The entire stock interests of all former stockholders have been acquired by Richard T. Hill, former treasurer, who is now President and general manager. Offices in the Book Tower, Detroit, have been expanded.

In addition to the construction of liquified petroleum, oil and catalytic gas plants, Trugas announces its appointment as exclusive sales representatives of the Posey Iron Works, of Lancaster, Pa., in Michigan, Indiana and Illinois.

Ruud Produces New Gas Heating Boiler

Compactness, light-weight, quick heating action and flexibility for variable weather conditions are points emphasized by the Ruud Manufacturing Co., Pittsburgh, for its new Ruudiator gas-fired boiler, now in production. Waterways are nonferrous and contain only 1.44 gallons.

The Ruudiator operates on all types of forced-flow hot water heating. No. 1067 (290,000 Btu per hour input) for natural, mixed, and manufactured gas, has an AGA output rating of 1,067 sq. ft. equivalent radiation. No. 800 (150,000 Btu per hour input) for LP-gas has a rating of 800 sq. ft.

McAlear Mfg. Brings Out New Pressure Controller

Increased accuracy in the control of diaphragm motor valves is claimed for a pressure controller recently placed on the market by McAlear Manufacturing Co., Chicago 8. It is recommended for (1) pressure reducing (2) back pressure (3) pressure relief

New Pressure Controller

(4) vacuum (5) vacuum relief (6) pump governor regulation and (7) boiler fuel governor.

The increased accuracy is reportedly due to the use of sensitive helix spring rather than the conventional "C"-gauge spring. The helix springs are normally furnished in a full range of working pressures in either type 347 stainless or beryllium bronze. Springs of other materials are available. For temperature control, the spring may be replaced by a thermal element at any time.

Other features claimed include: indicator and calibrated scale showing set pressure, adjustment of set pressure and throttling range without use of tools, change from direct to reverse action without disturbing presure connections and without tools. A mounting bracket allows installation directly over the valve being controlled or remotely, either surface mounted or flush panel mounted.

Seattle Gas Honors Service Veterans at Dinner

Old vets of the Seattle Gas Co. were honored guests late in September at the company's "OldTimers' Dinner," when long service to the organization paid-off in a good time and presents for the old-timers. A vet of some 57-years' proud service, R. Mark Anthony was the guest of honor and received an engraved gold watch at the hands of N. Henry Gellert, President of the utility.

Mr. Anthony was a lad of 17 when he first went to work for the gas company and has remained through the changing years. First he worked in the shop, and later read meters. He became a supervisor of both accounting and meter-reading departments. Although he has been eligible for retirement for several years, he has preferred to continue on with the company to which he has given all his working years. Today he is in the meter department.

Other service veterans honored at the dinner were Frank Sauer, 47 years service: William B. Addy, 45 years; William M. Spengler, 44 years, and 67 other employees with at least 25 years scervice each.

Detroit Regulator Produces New Low Pressure Valve

Maxitrol low pressure appliance regulators featuring a change in design and construction are now being produced in quantity by Detroit Gas Regulator Co., Detroit 7.

The regulators utilize the new principle of "straight-thru-flow" of gas from inlet to outlet. The structure of the valve and flow passages offers minimum resistance to movement of gas, so that friction and turbulence are sharply reduced. Pressure drops across the regulators are minimized and AGA rated capacities are correspondingly greater.

In addition to high capacities, other advantages are claimed by the manufacturer. Performance is superior with the new design due to the shape of the valve, seating surface, and flow passage. Regulation is said to be much more sensitive over a wider range of inlet pressures and thruputs.

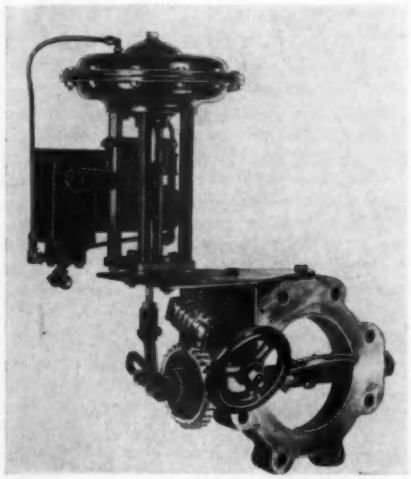
The high capacities of Maxitrol regulators, in many instances, make possible reductions in pipe size of entire manifold assemblies.

Information is contained in Catalog 50 which can be secured by writing the company.

New Air-Operated Butterfly Valves Introduced

A new line of air-operated valves for process control is offered by Fischer & Porter in sizes from 3" through 12". Advantages claimed are strength, lightness, compactness, convenience and accessibility.

Valve bodies are available in carbon steel,



bronze, 316 stainless steel, and other materials including plastics: vane is 316 stainless, fitted with rubber seal when required. Static line pressures up to 125 psig and differential pressures up to 50 psig can be handled. Standard "Rato-Vane" butterfly valves are supplied with hand jack screws, air operated diaphragms, and valve positioners.

Catalog 70 contains further information. Write to Fischer & Porter Co., Hatboro, Pa.

Bristol Publishes Radiation Pyrometer Bulletin

A bulletin on the new "Pyrovisor" radiation pyrometer has just been published by The Bristol Co., explaining the theory of radiation pyrometry and the features of the new unit.

Also included are photographs and diagrams illustrating accessories offered to adapt the unit for use with furnaces and kilns for indicating, recording, and controlling temperatures up to 4000°F.

Twelve-page Bulletin P1242 is available from The Bristol Co., Waterbury 20, Conn., on request.

Flexible Gas Connector

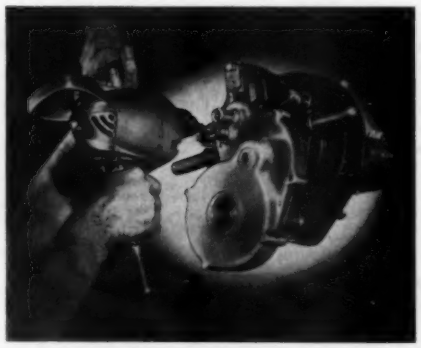
A new, flexible metal, AGA-certified gas connector has been announced by the Techniflex Corp. of Port Jervis, N. Y.

Constructed of flexible metal tubing with a female union at each end, the new connector allows the gas range or heater to be moved away from the wall for simple installation and cleaning and to hug the wall closely when in operation.

Samples submitted to local safety authorities in communities throughout the country have met with immediate approval, the manufacturer reports.

Portable Pipe Threader New Muncie Gear Product

Porta-Drive is a new portable pipe threader, weighing 14 lbs., and designed to fit into a workman's tool box.



Threading up to six inch pipe, it can be used in horizontal, vertical or angle positions. It is driven by any ½ hp electric drill and attaches to any standard set of dies by specially designed adaptor-yokes. An aluminum casing houses a bull gear and cold rolled spur gears, sealed in grease.

Information may be had from Muncie Gear Works, Inc., Muncie, Ind.

CONVENTION CALENDAR

October

11-14 *American Standards Ass'n.*, Annual Meeting, Waldorf-Astoria, New York.

13-14 *Texas Mid-Continent Oil & Gas Ass'n.*, Annual Meeting, Rice Hotel, Houston, Texas.

17-20 *American Gas Ass'n.*, Annual Convention, Chicago, Ill.

24-28 *National Safety Congress*, Morrison Hotel, Chicago, Ill.

31 *Independent Natural Gas Ass'n. of America*, Annual Meeting, Baker Hotel, Dallas, Texas.

November

7-9 *American Petroleum Institute*, Stevens Hotel, Chicago, Ill.

21-23 *Wisconsin Utilities Ass'n.*, Annual Meeting, Milwaukee ,Wisc.

27-Dec. 2. *American Society of Mechanical Engineers*, Annual Meeting, New York, N. Y.

December

4-7 *American Society of Refrigerating Engineers*, Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.

January

30-31 *Joint AGA-EEI Planning Meeting*, Netherland Plaza Hotel, Cincinnati, Ohio.

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"Straight-Thru!"
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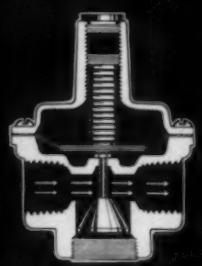

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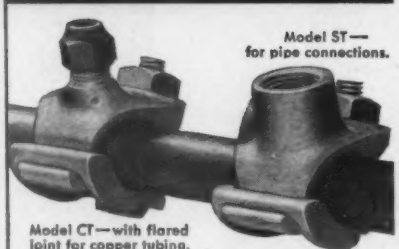

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John L. York Dies

John L. York, advertising manager of Clark Bros., Inc., Olean, N. Y., died recently after a long illness.

Mr. York was born in Olean in 1887, and attended the Fine Arts School in Chicago.

New Jersey Meeting

(Continued from page 34)

eliminate new installations for house heating. By 1946 it was evident that the company would have to build either new water gas capacity or change to straight natural gas. This change over was accomplished in 1946-47 and the delivery of 1030 Btu gas effected. The sendout rose from 100 million cu. ft. of 600 Btu gas in 1946 to 133 million cu. ft. of 1030 Btu gas estimated for the current year. Mr. Noyes stated that at present 95 per cent of the new homes building in the gas service area of Washington are using gas for house heating.

The Philadelphia situation is one in which natural gas is being used to augment the gas supply from two plants manufacturing water gas, reformed oil gas, coke oven gas and liquefied petroleum gas. The company purchases 20 million cu. ft. of natural gas a day for a system where the maximum daily sendout is 110 million cu. ft. of 520 Btu gas. The production problem as explained by E. G. Boyer is largely one of keeping the gas completely interchangeable when various combinations of the present types are used. He said that load forecasts indicate that the maximum day will increase from 110 million to 170 million cu. cu. ft. in the next five years.

Two speakers from outside the industry, Rev. George C. Vincent, Montclair, N. J. and Dr. Dwayne Orton, director of education, International Business Machines Corp., New York, discussed somewhat related phases of the human problems posed by modern industry and society. Dr. Orton developed the theme that modern business is an equilateral triangle of product, profit and persons, no side of which can be disregarded without imperiling the balance as a whole.

H. Vinton Potter, AGA coordinator of promotion, boosted the association's production, advertising and research plan and urged continued support and cooperation from the utilities in this activity. C. Edward Bartlett, Ruud Manufacturing Co., Philadelphia, was the closing speaker on the program. His theme "No Mean City" allowed him considerable latitude in extolling in inspirational vein the past accomplishments and the future promise of the gas industry.

Howard H. Melvin, Millville, N. J., President of the New Jersey Gas Association presented a brief resume of the year's activities before introducing the speakers to the 300 gas men who were present.

Officers Elected

The new officers of the association for the year 1949-50 will be: L. W. Becker Jr., Elizabeth, President; R. H. Philipps, Jr., Newark, first vice-president; T. R. Dobson, Asbury Park, second vice-president; and E. A. Smith, Newark, secretary-treasurer.

High Speed Drying & Curing System Developed

The Process Heating Co., manufacturers of ovens, conveyors and gas and electric infra-red equipment, has developed a gas infra-red and high air velocity system for drying and curing latex backing on carpets.

The system incorporates gas infra-red generators as the source of convected and radiant heat, and large volume fans with high velocity air jets as the means of impinging air, at velocities upwards of 2000 feet per minute, against top and bottom of the carpets.

A stainless steel balanced spiral conveyor, 7′ wide x 100′ long and powered by a 4′ to 28 per minute variable speed drive, conveys the carpets through a two zoned 50′ insulated oven.

The drying and curing zones are each equipped with a 7′ gas infra-red generator facing down, and four air cooled large volume fans, two above the conveyor belt and two below.

Both zones have separate exhaust systems for removing saturated air and volatiles, and indicating temperature controllers for maintaining uniform heat throughout the oven.

A "Premix" air-gas combusion system is used for supplying fuel to the gas infra-red generators which burn manufactured, natural, or LP gases. The system includes a high pressure turbo-blower, automatic butterfly air valves, atmospheric gas pressure regulators and aspirator mixers. Blast pilots, also with a "Premix" system, are employed to ignite the generators. These pilots have automatic sparkplug ignition.

To meet Factory Mutual requirements, safeguarding controls have been installed on both the oven and conveyor. This equipment includes safety shut-off valves, relays, air flow switches and flame controls.

Latexed carpets are treated to thermal shocks of radiant heat in both the drying and curnig zones, as they pass under the infra-red generators. These generators are located in the first three foot section of both zones. In the remaining sections the carpets are hit on both sides with high velocity air. The air temperature in the drying zone is maintained at 250°F., and in the curing zone at 350°F.

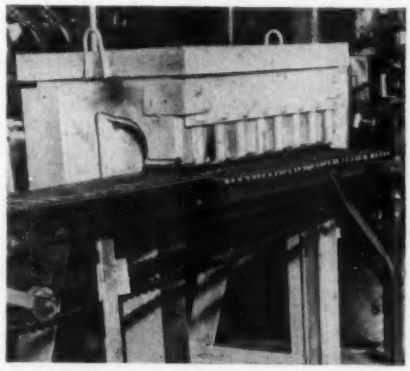
The temperature controls actuate a motorized air valve, which not only modulates the oven temperature, but also raises or lowers the intensity of the radiant heat. The temperature of each zone is also independently regulated by means of butterfly air valves.

This drying and curing range, primarily designed for the carpet industry, lends itself to such applications as the drying and curing of resins on textiles, baking of enamel on metal and plastic surfaces, drying of fur, setting of nylon, drying and baking of food products, curing of printed dyes on textiles, flashing of vinyls on paper, drying of paper, etc.

New End Heating Furnace Now Available

An end heating furnace employing recent developments in high speed heating design has been introduced by Gas Appliance Service. Claimed to be as much as two or three times faster than conventional furnaces, the new "Roto-Flame" furnace is said to prevent practically any scale formation.

High manifold pressures, a small combustion chamber and the design of the chamber itself, according to the manufacturer, are features of the furnace. It is used



for forging, swaging, upsetting, threading, hardening and annealing. The ends of the pieces being heated are entirely enclosed in flame.

When in operation, the curved refractory section becomes completely incandescent, with the radiant heat from this surface further increasing heat input. The shape of the refractory also serves to carry the flame inward, instead of letting it escape through the front slot. This keeps the operator much cooler and permits the use of a conveyor.

The furnace is available in several different sizes and lengths. Further information may be obtained from Gas Appliance Service, 1211 Webster Ave., Chicago 14.

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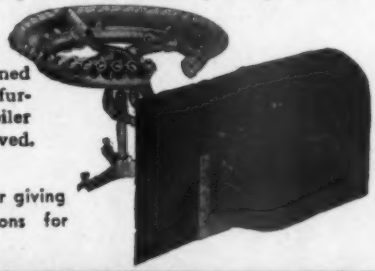
HOME OWNERS SAY—Gives quick heat transfer and earlier delivery of heat to rooms. Has tamper-proof controls and quiet operation.

MODEL P-ZE shown here is designed for use in warm air furnaces or round type boiler where grates are removed.



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GET CATALOG TODAY! HY-21B

New Check and Needle Valves Announced by Pneu-Trol

Two new valves for air and hydraulic use have been introduced by Pneu-Trol Devices, 3122 N. California Ave., Chicago. Both the Vernier type needle valve and floating ball check are said to combine sensitivity with rugged construction.

Features of the check valve are sensitivity of the floating ball to open full or completely close at changes in flow direction. The check valve is readily converted to a fixed orifice control valve by drilling a pre-determined reverse flow orifice through the entry port of the valve body.

The needle valve has a long tapered needle, which allows a fine Vernier adjustment.

Both Valves are made of hexagon bar stock in brass for pressures to 1000 psi and steel for 5000 psi. Internal parts are of stainless steel. Available in ⅛" to ¾" pipe sizes.

W. E. Pickens Now Engineer with Dearborn Chemical

Dearborn Chemical Company, manufacturers of rust preventives and wrappers, has announced the addition of W. E. Pickens to its pipe line department as a service engineer. Mr. Pickens has had wide experience in the application of rust preventives to pipe lines, having served in a supervisory capacity for such organizations as Sinclair Oil Co., Williams Brothers Corp., Oklahoma Contracting Co., and El Paso Natural Gas Co.

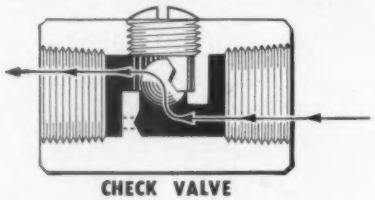
He will make his headquarters in Dearborn's Chicago office but will devote his time exclusively to field work assisting and advising construction projects.

Booklet Describes Belfield Line of Cocks

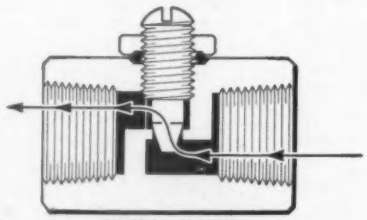
Bulletin No. 100-1, published by the Minneapolis-Honeywell Regulator Co., Belfield Valve Division, covers the Belfield line of cocks recommended for shut-off service.

Many illustrations and sectional drawings are included in this bulletin.

A copy will be sent upon request to Minneapolis-Honeywell Regulator Co., Belfield Valve Division, Philadelphia 44.



CHECK VALVE



NEEDLE VALVE

Diagrams of the new valves

Rock and Swamp

(Continued from page 25)

a few miles, while the new pipe line keeps to New York State.

One of the difficulties on this pipe line replacement project was the necessity of keeping heavy equipment off the established right-of-way. Seventy-five years ago, when some of the oil lines were put down, it was cheaper and easier to lay the pipe on the ground, or in most shallow trenches, than to try to dig proper ditches in the rocky ground.

Therefore, cats, bulldozers, ditchers and the like, brought to the job by general contractor Williams Brothers Corp., had to keep away from the center of the right-of-way. In some areas the old oil lines were exposed to view—in other places they were just below the surface of the ground.

The location of most of the 1949 construction lies between the Ramapo and Pocono Mountains. Rock was plentiful. So were swamps that seemed to have no bottom. About 80 per cent of the new ditch had to be dynamited through rock. The depth of the ditch was controlled to assure a 28 in. cover on top of the steel pipe.

It was very strange to encounter rocks as big as automobiles buried in these swamplands. Some of the huge boulders we were able to push out of the path of the new pipe line with our bulldozers. Others were located—a steel line wrapped around—and they were pulled away. Still others were blasted.

To get into the swampy land we were forced to build corduroy roads. These were constructed from trees that were cut down in the widening of the right-of-way. Layer after layer of such brush was laid in and on the swamp.

We found that ditchers were of little value in this country. So, we employed backhoes to dig our ditches—some of them completely covered by water. We then used cast iron and cement river weights spaced about 40 ft. apart to assure the pipe sinking to the bottom of the water-covered ditch.

The pipe line has crawled through many miles of "wild" country since April of this year when the job was started again. By November the contractor expects to have the new pipe line completed.

Employes Get Increases

(Continued from page 37)

worker got up a petition to fire his foreman.

A United States Circuit Court of Appeals in Cincinnati held that in the case of an Ohio utility company, a worker is exempt from provisions of the Taft-Hartley Law if he performs some supervisory tasks some of the time.

The Virginia State Supreme Court of Appeals judged that the law against Closed Shop contracts, in that state, is legal. Court characterized discharge for refusal to join a union as "illegal denial and deprivement of employment."

CRUSE-KEMPER COMPANY

AMBLER, PENNA.

MORE THAN FORTY-FIVE YEARS OF SOUND

STEEL PLATE CONSTRUCTION

GAS HOLDERS PURIFIERS

New Electric Interval Timer to Be Available

International Register Company will soon start production on a new electric interval timer, Model ITC-1020. This timer has a 60 minute dial for timing short cooking

periods and a supplementary "hour" dial for timing intervals up to four hours.

It is equipped with a "buzzer signal" and clock face and hands. For information, write to International Register Co., 2614 W. Washington Boulevard, Chicago 12.

Fire Brick and Refractory Booklet Is Issued

A new bulletin on Mullitex fire brick and refractory has been released. Properties, typical applications and detailed information on these and other refractory materials are included in a reference table.

Copies are available on request to Walsh Refractories Corp., 101 Ferry St., St. Louis 7.

Corrosion of Mild Steel by Combustion Products

"The Corrosion of Mild Steel by the Products of Combustion of Gaseous Fuels" is the title of an engineering study recently completed for the American Gas Association by Batelle Memorial Institute, Columbus, Ohio.

The study was sponsored by the AGA Committee on Domestic Gas Research, of which R. J. Rutherford, vice-president, Worcester Gas Light Co., is chairman. It is stated that while this report covers only a study on mild steel, further investigation is contemplated on steel alloys and other metals which may be used in the manufacture of domestic gas appliances.

Copies of this 52 page report are available from AGA at 75 cents each.

Burdett Has Radiant Heat Unit for Homes

Burdett Manufacturing Co., has announced development of a specially designed gas conversion burner for home heating employing the radiant heat principle.

According to the company this equipment is power operated and supplies the burners with a pre-mixed gas-air mixture requiring a minimum of secondary air. The unit is said to be compact, quiet and clean burning, and operation is claimed to be extremely efficient, with fuel savings up to 25 per cent.

It will operate on natural, manufactured or mixed gas.

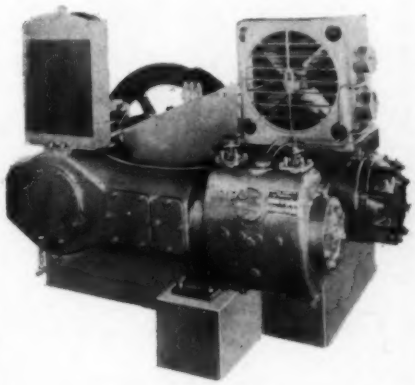
Four standard models are available, in capacities of 120,000, 160,000, 200,000 and 280,000 Btu. They are designed for warm air, hot water and steam heating systems.

Information may be obtained from Burdett Manufacturing Co., 3433 West Madison Street, Chicago 24.

Two New Compressors Offered by White-Roth

Two new units for compressing natural gas, or for use in the liquified petroleum industry or other industries requiring gas at higher pressures, are announced by White-Roth Machine Corp.

Designated as Lorain model L-7-S and O-7-S compressors, they are powered by



Lorain Model L and Model O multi-fuel engines. The single-stage compressor is driven through a double-throw crank that reduces the 10" engine stroke to a 7" compressor stroke for high-pressure work and to match compressor range to engine horsepower output.

Compressor cylinder has full force-feed lubrication including lubrication of metallic rod packings. Two independent cooling systems permit the compressor cylinder to be operated at a lower temperature than the engine. The compressor cylinder is designed with bottom discharge to prevent accumulation of gas condensates.

Specifications and data are available from the manufacturer at Lorain, Ohio.

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W. E. Davis Is Now with Roberts-Gordon

W. E. Davis has joined the Roberts-Gordon Appliance Corp., of Buffalo, manufacturers of conversion burners and gas heating equipment, as assistant general sales manager.

Mr. Davis was formerly employed by the Equitable Gas Co., of Pittsburgh, where he served as assistant general sales manager.

It was recently announced that the company is now on a three shift basis.

LATTNER GAS BOILERS

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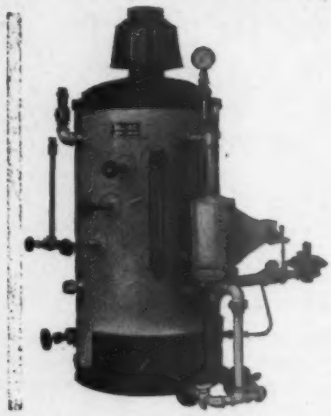

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